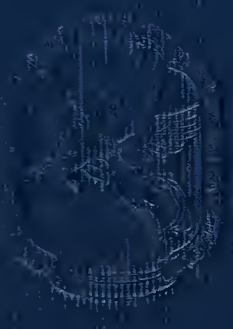

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OUR CHANGING CIVILIZATION

HOW SCIENCE AND THE MACHINE ARE RECONSTRUCTING MODERN LIFE

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FREDERICK A. STOKES COMPANY

NEW YORK MCMXXXIV

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29-2077
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PRINTED IN THE UNITED STATES OF AMERICA

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If philosophy declines to observe and interpret the new and characteristic scene, it may achieve scholarship; it may erect a well equipped gymnasium wherein to engage in dialectical exercises; it may clothe itself in fine literary art. But it will not afford illumination or direction to our confused civilization. These can proceed only from the spirit that is interested in realities and that faces them frankly and sympathetically.

JOHN DEWEY

OUR CHANGING CIVILIZATION

I

OUR CHANGING CIVILIZATION

We had been spending some weeks in the small Italian towns of Tuscany and Umbria that cling to the steep hillside under the shadow of a sheltering fortress and look down upon the fertile valley below. We had sought to avoid the material progress of Mussolini's Italy, with its new factories, its tooting motor-cars, and its unsavory banking operations. Though in the large cities there is the familiar show of business activity, and the realtor flourishes with his subdivisions and his hastily built, bare villas, as yet even the Fascisti and their moneyed backers have hardly touched the surface of the immemorial Italian life. It is not difficult to rattle along in a ramshackle mail bus, or to crawl in an ancient carriage, a few miles back in the hills away from the railway, and find the countryside much as it was seven hundred years ago. These fields have borne grain from the days of the Romans; these olive groves festooned with the wine-giving grape were laid waste by the Lombards when they pushed in to succeed the Romans as masters. The farmers still live in the vil-

lages in which their forefathers took refuge in those troubled times. The towns still look down upon the fields from the high hilltops where they were securely perched long before the power of Rome had brought an end to neighborhood warfare.

In these valleys the feverish problems of modern Italy seem strangely remote. Here the life of the ordinary man has followed the same round century after century,—birth, toil, marriage, toil, and death, the same back-breaking work in the fields, the same creaking ride to market to dispose of wares, the same thoughts uttered, the same proverbs quoted, the same songs sung. For him the ways of his father are good ways, and the ways of his father were the ways of his forbears in the twelfth century, and, one suspects, in the second. For him, as seven hundred years ago, the blessing of the Church rests on all the events of life; its rites, its observances, its processions, are the natural expression of his hopes and fears. And the Church itself is hardly a new intruder in these valleys. The learned who watch the joyous festivals in honor of the local saints tell of the same rites offered to Roman gods whose shrines can be found beneath Christian altars; and before them the Etruscan deities had their day. The Church came, and saw, and was conquered; and men still looked to heaven in time of joy and sorrow, and found in religion the outlet for all the aspirations that rose out of man's hard lot, and in the homely wisdom of the priest a sufficient guide to the perplexities of life.

When one reaches the town at last, and climbs the steep streets to the market square, once the forum, now flanked by the church and the town-hall, one can

well believe the local tradition that here no house has been built since the thirteenth century. At that time this region was next door to the commercial center of Europe. Its merchants traveled far and wide, and into these hill towns there flowed the trade and the ideas of a vigorous life. The town hall was built in the new Gothic style the local traders had admired beyond the Alps. The great fountain was set up and adorned with a marble Virgin attended by carved virtues and vices. The walls of the church were covered with brightly colored pictures of the Last Judgment in the new style, painted by a famous artist imported at great expense from Florence.

But the currents of trade turned, and in this once prosperous town time stood still. Men went on living and working in the old way, but no new houses were built, and no new ideas came up the winding road. The city of the Popes might have its burst of glory; all Italy might be passed from Spaniard to Austrian and back again. Elsewhere men might break from the Church, or discourse at length of reason and nature, or even grow enthusiastic over liberty and equality. In other lands factory chimneys might smoke and cities spread over the countryside; here it meant only that curious Inglese appeared to stare and leave money behind. A citizen of the thirteenth century might return to-day to walk the streets, take part in the procession to the church, or mingle with the women scrubbing clothes at the public fountain, and feel no such gulf between him and this life as in our western land divides fathers and sons.

After a few weeks spent with this sturdy people we had nearly forgotten all that has happened since the

trade of Europe ceased to flow through Italian ports. We had grown used to seeing household tasks carried on as they have been since the Romans first built these houses. We had come to expect a potter at his wheel or a coppersmith at his vise beyond some open door. And the ever-present atmosphere of the Church, its lighted shrines, its tinkling chapel bells, its old priests and its few clean-faced young monks, had become as natural as the golden glow that shines at sunset over these hills, and as much a matter for indifferent acceptance.

Then a letter took us over the Alps to Munich, and we resolved to pay a visit to the new German Museum that had arisen since our last stay in the Bavarian capital. Every tongue among the group of students with whom we were living had sung its praises; it was wonderful, marvelous, unique. It stood to the world as a symbol of what Germans could do even in these post-war years. With our heads still full of the ways of Italian townsfolk and peasants, we went down to the island in the Isar where it spreads its bulk, massive and solid like the fortress of a new conquering race.

The German Museum is indeed remarkable. And it is in truth the garrison shrine of a new religion and a new civilization, set down in this pleasant city that holds so many memories of the poets and artists and musicians and dreamers of the Germany of a century ago. For it is a great temple erected to the gods of the new age, Science and the Machine. Here are spread out the records of human industry and human invention, from the first crude devices of barbarian craftsmen to the latest products of the rolling-mill and the machine-lathe. Here is the arsenal of the weapons man

has built himself in his long war with nature. For centuries the record is scanty: a few models of ancient bridges, mediæval plows, early printing-presses, an alchemist's laboratory. But with the 18th century the number swells. Here is a room of cotton spindles from the days of the early Industrial Revolution. Here are the first power looms and crude steam-engines.

The exhibits multiply in number as the 19th century waxes, and for the great machines of the last generation there are huge halls filled with the clanking of mechanism in motion. Wing after wing is devoted to the textile industry, to metallurgy, to paper-making, to printing and dyeing, to the manifold trades that Germany has fostered. There is a whole floor for transportation, with specimens of bridges, roads, ships, canals, trains, motor-cars, and air-craft. The ground below is honey-combed with coal-mines and ore-mines, winding tortuously underneath the machines like the crypt of some ancient church. One small gallery suffices for the farm-machinery; for not by toil in the fields do the worshipers of these gods win their daily bread.

On the upper floors, resting on this industrial foundation, are the chapels of pure science, where the natural principles that have made possible such technical advance are illustrated by working models. Here one can trace the story of the early discoverers with their simple instruments, down through the delicate apparatus of the chemists and physicists of to-day. In a high tower are the telescopes that search the heavens for new truth. It was from the sky that man first learned of the order of nature; and as the spires of a cathedral seem to strive to bring God down to man, so from this modern temple watchers on high are seeking

new energy to feed the many hungry machines below.

Perhaps had we come by easier stages from the Italian middle ages to this world of the factory and the laboratory, we might not have been so deeply impressed by the German Museum. In the trip from Umbria to Munich we could, indeed, have traversed all the stages that separate these two worlds. The twin gods of the Machine and Science might then have seemed as much at home in Germany as the Trinity and Mary and the saints in Italy. But so swift had been our journey that we could not shake off that initial impression, that here on this island was the stronghold of a new civilization, set down in the midst of the old Christian village society, and destined to lay it waste more ruthlessly than ever did barbarian invader.

In Germany it is easy to grow reflective over the destiny of nations and civilizations. As we wandered through the crowded halls of that huge museum we soon ceased to see the separate machines and models. Rather we mused on what this monument of care and ingenuity might signify; and the more we reflected, the more clearly it seemed to stand for all those forces of our modern life that have already made the Italian valleys a quaint survival from a past age. A century ago, and a life like theirs was led in every land. There were local differences, to be sure, but though those village communities might speak different languages, they uttered the same thoughts. And those thoughts, it suddenly struck us, are completely irrelevant to the world of the German Museum.

There is not in that entire building one object, one idea, that the Umbrian peasant would find familiar. And there is not in that peasant's life one thought, one

emotion, one action, that has a place in this new world. The two realms are completely different; they could not be further apart if they belonged to different species. And the lords of this new kingdom have become our masters. No wonder the gray building looked like the citadel of an invading army. It is the stronghold of forces that have burst upon our Western life to transform it beyond all recognition. They have held sway over us barely fifty years, but already they have destroyed more that is old and built more that is new than any invading army in the history of man. The life of the Umbrian peasant, in all its major outlines the life of the overwhelming mass of men everywhere in Europe and America three generations ago, to-day seems as remote and alien as the life of the Chinese upon the banks of the upper Yangtse or the Hindu at Benares. Indeed, the man of those days would feel far more at home in China or India than in the modern city or factory town where we now dwell as a matter of course.

These are two worlds apart, that of the peasant and that of the German Museum. In which are we really living to-day? In truth, we inhabit both. Our bodies live in a world where machines are triumphant and where science is their servant. But we cannot yet feel really at home in the bare halls of the factory or the laboratory. We are still attached by a thousand ties of tradition and loyalty to the thoughts, the ideals, the aspirations that move the peasant. We are not yet really living the life of the new civilization. Our machinery is modern; but our institutions are mediæval. We still peer in wonder and awe at the machine, we still gaze at the scientific instrument with dimly com-

prehending respect; and then, like these crowds of Munichers, we betake ourselves to the opera to listen to Wagner or to the church to hear mass. We build a German Museum and invite the Kaiser and Crown Prince Rupprecht to dedicate it. We live in a society that is falling to pieces, but over our beer we talk lovingly of the good old days of the monarchy, and we listen with respect to the reproofs the archbishop administers to the morals of the younger generation.

The more thoughtful among us speculate on the outcome. How long can the civilization we have inherited from the peasant and the villager endure? How long can it withstand the steady onslaught of the Machine and Science? There is no sign that they will turn aside from their triumphant march. They have already started the age-old civilizations of the Orient to totter and crumble; what can oppose them in their native West? The civilization in which they have taken root like some rank weed, the civilization in which we still try to lead our lives, grew up over long centuries in the peasant's world they are destroying. That civilization was rooted in the countryside; it was built by men who toiled in the fields and felt the wind and the rain and looked up to the hills and the stars. For most of us the countryside is already gone; we see only city streets and feel the hot breath of the machine and look up at the glaring electric sign. That civilization culminated in a religious attitude which, in Christianity, expressed the natural feelings and thoughts of generations who lived the life of simple cultivators of the soil, dependent on the wayward forces of nature. Our highest aspiration is the enjoyment of movies and radios and tabloids and motor-cars, and we are de-

pendent upon some vast economic organization that stretches its tentacles around the world. The problems of the Umbrian peasant are not our problems, his ways are not our ways, his thoughts cannot be our thoughts nor his feelings our feelings. How long, then, can the great traditions that come down to us from the past, our heritage of religion and moral ideals, of economic and political and artistic thought and institutions, continue to survive in a world where the machine has created for us a new environment and science a new universe? In a civilization thus divided against itself, it is little wonder there is no inherited loyalty that does not feel the passions of civil war.

Just what are to be the characteristics of the new society that is emerging from the factory and the laboratory? What are the dominant traits of the world foreshadowed here in the German Museum? The machine, technical invention applied to mass-production, is the corner-stone supporting the whole structure. The machine itself rests on a foundation of natural science; but it is significant that here the only science admitted is the science that can be translated into practical invention. The sciences of life, the sciences that satisfy man's curiosity about himself and his fellow creatures, and that can perhaps teach him the wisdom that is born of self-knowledge, are conspicuously absent. They have as yet given him no practical control over his environment. The astronomers, to be sure, are granted a tower; but that is a sort of pious tribute to those who first discovered in the stars the order of nature that man has since so thoroughly exploited for more worldly ends. The astronomers, moreover, use marvelously delicate machines, and it is after all perhaps

these by-products that secure them admission. If Darwin had only employed some complicated apparatus, he too might find a niche along with the metallurgists.

The machine and its handmaiden science have brought their own world with them. Look at the labels attached to the exhibits. Almost without exception, they bear prominently the name of some great corporation that is a formidable part of Germany's industrial life. This museum is the gift of the factories, foundries, and steamship-companies that have grown up about the machine to control it, and through their privileged access to it have come to mould the country's destiny. In that other Italian world there was also a great organization whose power was likewise based on a monopoly of what men most desired. It was the Church, and in its appointed way it brought to men the indispensable grace of God. But the new world lives by machine production, not by prayer and forgiveness. The complex organizations that have arisen to control this modern means of salvation have secured a power over men's lives that even the hierarchy of the Church must envy. It is on their sufferance and by their generosity that this collection has been made. As the Church of old alone possessed a stock of holy relics, so the corporation to-day is the sole dispenser of the machine. As our dependence on the products of the factory increases, this economic power exerts more and more control over our lives. To many it has come to stand as the core of the new civilization. Under the magic name of "Capitalism" it is cursed and praised for all that comes to pass of good or ill. Assuredly this "Capitalism" has played a major part in destroying the old peasant life; but it is a question whether it really con-

trols the machine or whether it is itself but the machine's creature.

The factory, the counting-house, and the laboratory have called into being the city. Every stone of this museum cries out of city life. In the age of coal and steam men must huddle together near the factory chimney; and though steam give way to gas or electricity, mass-production will still demand great ports and centers of distribution. City life in turn brings new needs and problems which only more machines can satisfy. Few of the inventions here would have been needed in the old farming community; once adopted, they cry for more inventions to make life with them bearable. And with added complexity in this artificial environment, the old country customs grow harder to maintain.

The city has two variants: the great center of commerce and finance, and the factory town where goods are actually made. Both have little in common with the Italian market-town that serves the countryside. Life in the one is lived in the office and the warehouse, with a hasty rest in two or three crowded tenement rooms; in the other it is spent in the factory, around which stretch row after row of workingmen's houses. In both are found the same standardized amusements, the same machinery for providing the same needed thrills, the same movie passions, the same jazz music, the same murder trials. In neither is there any place for the simple human intercourse of the market place where the farmers drove in to sell their varied products and to join in discussion with the townsfolk.

For mass production has destroyed the human variety of the old life. The machine has no individuality.

It has no room for the subtle differences that distinguish the copper kettles of two neighboring Umbrian towns, or the lace-stitches that vary from parish to parish. Look at the model of the monk in his cell carefully copying an old manuscript in miniature. Then look at the modern newspaper press. Look at the old 18th century paper-mill, each wooden beam carefully hewn on the spot to serve its end. Then look at the roomful of mechanism that to-day converts logs into newsprint—which the placard announces is installed in dozens of towns alike. Look at the old weaver at his hand-loom, carefully working a design of his own into the pattern. Then look at the modern Jacquard loom, into which you feed standard designs like the roll of a player-piano. Why is it that to one fresh from the spirit of Italy the older processes and the crude appliances seemed always the more interesting? And why, to an inexpert eye, did all the newer machines look much alike, the looms like the presses and the lathes like both? These intricate contrivances are highly specialized; yet the more adapted they are to their specific tasks, the more they make the same demands upon their tenders, and the more they carry about the whole world the vast cosmopolitanism of mechanism. What will be the effect upon human life, so marvelously varied and so richly diversified, when the machine has fully consolidated its hold upon us? Is the new city culture of America, fed on the tabloid, the movie, and the radio,—themselves the latest product of invention—is this the promise of a unified, standardized world culture of the future?

So far the museum has indeed suggested just such a future; but there is besides the great fact of the mu-

seum itself. The subtler forces that have created it are as unprecedented as the factory; the peasant knew nothing of them. Yet though they too belong to the new world, and have come as allies of the machine, they bid fair to bring an even greater revolution than has the factory. One looks at the throngs of eager youths, boys and girls brought by their teachers to use this unrivaled means of education for our modern life. One watches the fascination with which they manipulate the scientific models and explain the workings to one another. Then one remembers the placid and stolid faces of the Umbrians and their unquestioned acceptance of their lot. Here is something that peasant world never enjoyed. These boys and girls are seeing their civilization in its development; they are learning the truths on which its technical achievements rest. They are beginning to reflect upon its course, to see it in perspective. They have not merely become literate; they are acquiring a genuine education. The very existence of this museum and its admirable facilities for the student are an evidence that the new civilization will not train mere machine-tenders who will read the tabloids. Mass-education is already being tried. Who can predict what a nation that has grown up with such an incentive to reflection will do with the machine that is changing its life? There are special reasons why the Germans are particularly concerned with the cultural shifts that are overtaking them and every industrial nation; but is it too much to see here a herald of what will grow universal in the future?

Such mass education has never been in the world before. There have been movements for widespread literacy, connected with the religious motive of Bible

reading. There have been for a century efforts at popular education, inspired partly by democratic and partly by nationalistic motives. But these previous attempts at reaching the average man aimed to instil in him some traditional lore; they did not seek to give him an understanding of the world in which he was to live his life. The machine has brought with it plenty of such indoctrination; those who control economic power have seen to that. But the machine age demands more; it needs not only literacy, it needs skill and intelligence and a loving devotion to science and the scientific habit of mind. The training that gives such fruits cannot fail to lead at least some on to fearless, realistic thinking about human problems. The German Museum may have been started as a collection for the technical expert; but the young students who visit it cannot help reflecting on the whole civilization it represents.

Like other institutions of similiar origin, it might have been content to bring together a few relics from the outgrown phases of industrialism, mingled with models of recent achievements. But so carefully have the exhibits been ordered, and so completely have they been gathered, that one finds instead the whole panorama of man's advancing conquest of nature. Perhaps as yet only in Germany could the work have been carried through with such a historical sense for the changing stages of industrial growth. But that awareness of change, that sense of the relativity of present forms in the light of what was and what is yet to be, is a rapidly growing factor in the Machine Age. These Germans, whom circumstances rushed rapidly a century ago through stages that occupied the rest of Europe hundreds of years, were the first to reflect on the sig-

nificance of such change. But all of us to-day have at last become aware that profound dislocations are taking place, and that even greater transformations are to come. No longer can the machine and science build a new world without men marking the process. Such a historical sense, nowhere more vividly illustrated than in the German Museum, means that we shall no longer be swept along blindly. We shall at least see whither we are being led, and, perhaps, we shall be able to avoid the worst obstacles in the path.

I say, we,—for these things are now the concern of all men. The presence of such an institution, spreading its treasures freely for all who have the intelligence to partake, is a tribute, in this land that politically has wavered between communist dictatorship and monarchist direct action, to the democratic spirit that has spread with the machine. For all their divergence from more Western political ideals, the Germans have stood for a democracy of the mind that opened opportunities to every man to travel as far as his talents could take him. The revolutions of 1918 completed this equality by breaking down the barriers still existing in the educational system; and of this final liberation the German Museum is a fitting symbol. Men are henceforth to participate in shaping their destiny.

One final force of our age is present here in full strength. This is a museum of industry and science, and it might seem that they at least know no national boundaries. Yet this is the German Museum. The nationalism that alone of the great forces in our transitional life seems to cut across the path of the machine and science and their allies, offering a resistance no other part of our heritage can show, has left its imprint

upon this shrine of the new order. This is, after all, a monument to German industry and German science. The German past has furnished the historical examples; German factories have installed the machines. The apparatus of the scientific discoverers bears the names of men not credited in other lands with these achievements. Here the record of inventors known to every American schoolboy is absent, and in their stead are a host of good Germans who antedated their discoveries by a generation. Even science has felt the influence of the nationalistic atmosphere. One can, if one wants, see in this German Museum the attempt to capture for the Fatherland the glory of the new world. Will nationalism alone of our old familiar life remain in the coming age, a powerful but alien factor destined to destroy it before it is full-blown? One's mind wanders to that grim submarine installed in the basement, and the hushed and curious figures peering into it.

The machine, science, capitalism, standardization, the city, mass-education, the historical attitude, democracy, nationalism—these are the forces that are together making the new world. These have a place in the German Museum. And no one of them was known in Umbria. Umbrian life, the universal life of Western man before the last century, was rooted in the soil. It was founded on agriculture and the community trade of a farming district. It knew not the city, nor the world-wide economic organization that now binds men together. It was the life of a small district, united only in the Church to the many similar districts throughout Christendom. All its customs and beliefs had grown up in the countryside, and were appropriate to men who lived amidst the growing crops and felt the simple,

universal human emotions. It flowered in the religious and moral tradition that united Christendom. The religion that it held most dear, that was the great imaginative expression of all its moods and feelings, is not only completely lacking in the world of the German Museum,—it seems utterly irrelevant. Religion and the machine have nothing in common,—unless man makes the machine itself a god. The moral tradition that was adapted to the problems and conditions of the countryside and the market town still lingers on in weakened form in the city; but the problems of city life, of industrialism, of capitalism, of nationalism, find no answer there. Nay, the tradition of liberty and individualism, fought for by the citizens of Italian towns centuries ago, achieved by farmers and traders after many a struggle, the ideals that have seemed to us the supreme gain of our whole moral career, seem as irrelevant as religion itself to the world where men live in rows of little cottages and serve the machine in its factory. And the art that comes so naturally to the Italian, the whole artistic tradition of Europe that flowered in the Renaissance whose stamp still dominates the Italian towns, that art too has no place in this world. It was an art that grew naturally out of handicraftsmanship, that was not an adornment apart but the natural form that any human activity took on. That too seems gone.

What does the new age hold? That we are on the threshold of a civilization so different from the old that nothing to which we have grown attached will remain untouched, is beyond question. That that new civilization is already upon us, with a strength that nothing can withstand, unless it be a universal destruction brought on by nationistic rivalries, is just as certain. Our

thoughts, our beliefs, our ideals, our most cherished habits of action, are still left over from the pre-industrial, pre-scientific age. Already they have been sorely weakened; on every hand we are reminded of the dissolution of the old ways. As yet little that can last into the new age has taken their place; we are still torn between two worlds. Our bodies work in the city factory, our hearts are still in Umbria; our heads, alas, are torn with doubts and bewilderment. Will anything of our Christian civilization be left? Will we still have a religion or an art, will any of our old ideals prove adaptable to the new world? What happens, indeed, when one civilization gives way to another? We do not have to plunge from mediæval Italy into the heart of a technological museum to face these questions; they are part and parcel of our daily lives. They press upon us with an insistence that will not be denied. It is in the hope of throwing some light on such questions that these pages are set down.

II

HUMAN NATURE, FOLKWAYS, AND FOLKLORE

Before we can hope to answer the questions as to the future that a candid facing of our changing institutions forces us to ask, there is one point on which our minds must be clear. So long as we think that the ways and beliefs of every other age or people are merely strange and interesting phenomena, while our own are naturally and obviously true and right, we shall not be able to understand what our civilization is, nor how it came into being, nor what it is changing into. No man can presume to pass judgment on present tendencies if to him such institutions as private property or the two-party system or life-long monogamy are arrangements whose superiority to all others no reasonable man can question. If he thinks that communism or temporary sexual unions are ridiculous notions, and that the societies that have practiced them must have been mad, he may be able to fight for his own ideas, but he will not understand them. He who believes that Paul formulated the final path of human salvation, or that the teachings of the Sermon on the Mount are valid for all times and places, has little idea of the part that religion plays in human life. He who imagines that 19th century astronomy is the true story of the heavens, or that present-day chemistry has all the facts, hardly understands the significance of science.

Men who have looked down on cities and countrysides from airplanes tell what a sense of detachment and aloofness that experience gives. Can those little crawling specks along the narrow ribbons be men, with human passions and human schemes? Can those clustered smudges upon the green flatness be busy cities, teeming with commerce and pleasure and crime? From the elevation of a few thousand feet all men look alike, and all human works equally insignificant rashes on the face of nature.

We cannot hope to see our own tumultuous life as it really is, without passion and without prejudice, unless we can cultivate something of that same detached clarity of vision. To be sure, we cannot live forever in the air; we must dwell in the cities of men. We must have our firm beliefs and our passionate strivings. But we cannot escape our hopes and fears to find unclouded knowledge unless we at least try to subject our own deepest convictions and loyalties to something of the calm scrutiny and analysis with which we would approach, say, the social life of the white ants. Humanly speaking, of course, such complete objectivity is impossible; but the effort will lead us to see more clearly the convictions by which we must live. And if we make it, we find that every group of men of which we possess any record whatsoever, in all ages and all civilizations, has lived by a series of activities and held a mass of beliefs that for them were good and true. Though human societies are vastly different, though so rich is their variety we may well wonder whether any new custom or new idea is now possible, yet each has at its best lived a complete and rounded life, and found answers to its questions in an intellectually satisfying view

of the world. If we can really lay aside our own prejudices, and enter sympathetically into any of the more complex civilizations, like the world of Pericles' Athens, or of Lorenzo's Florence, or Goethe's Weimar, or our own New York, who can say which life was really wiser or better? If we come to understand any of the more complicated systems of ideas, like the science of Aristotle, or mediæval scholasticism, or the philosophies of India, or our own Western science, we realize how different were their aims and how diverse their fruits, how varied their tests and means of verification. But who that is really emancipated from the limitations of his own group beliefs will dare to say which is ultimately the truer? Through them all runs the same life of the mind, the same search for rationality and understanding.

In such an endeavor to forget for the moment our own beliefs we gain a sense of the fundamental unity in all this diversity. We feel the pulse of humanity beating in every civilization, shaping beliefs and ideals that in different ways satisfy the recurrent human impulses and cravings. If we can thus contemplate our own civilization and our own truth, and realize that though it is different, and though it is ours, it is still, in the eyes of God or of any detached intelligence, no better and no truer than that of other societies, we are liberated from our accustomed provincialism. We can not only understand and sympathize with other peoples, but we can also understand why we ourselves act and believe as we do. We can learn to use our own civilization, to master it rather than remain its blind slaves. And when it becomes clear how that civilization is passing into other forms, we need not be perturbed

at the steady march of science and technology. We need not mourn customs and beliefs that are disappearing, but with open eyes we can look eagerly toward the future, and inquire how we can make it realize its fullest possibilities.

To-day it is the anthropologist who has most cultivated this objective way of looking at civilizations. Anthropology among its other aims devotes itself precisely to such comparative study of group cultures. For the most part it has found the life of simpler groups easier to deal with. Its methods of analysis and its characteristic notions and concepts have grown out of the study of so-called "primitive" peoples, like the Indians or Eskimos or Australian blackfellows. Quite wisely the anthropologist has refrained, until his technique is better developed, from entangling himself in the vexed problems of highly complex civilizations like our own. But the time has come when all of us who care to understand our own society must learn something of his objective spirit. What a civilization is, how it actually functions, how its elements came into being, what happens when they meet new forces and ideas,—these are all problems we cannot escape, and upon them the anthropologist can throw much light.

The whole manner of life of a people, all their ways of acting, their standards, their techniques, their beliefs, the anthropologist calls their "culture." He does not use the term as it is perhaps commonly employed, to denote a certain superior education, belonging to privileged individuals or classes, as when we refer to a "man of culture." He means rather everything the group does and feels and thinks, all its activities, of whatever nature, except only the purely individual

physical processes of its members, like digestion or the pangs of hunger. This culture belongs to the group as a whole. It is there when each member is born into the group, and it determines the way he will act, the thoughts he will think, even the emotions he will feel. It is a certain mould of group life, built up over long generations, always open to change from without and within, but much more permanent and stable, even when changing most rapidly, than the beliefs and habits of individual men. Every group of beings that can be called human has possessed such a set of social habits and beliefs, such a culture, that has provided ways to do all that they felt impelled or constrained to do.

These ways have to be learned by each new infant that is born. The first part of every human life is taken up with learning what the group thinks, how it acts, how it feels, in the face of every situation that confronts it. The remainder is spent in living out these group activities, with perhaps a few minor departures. Because they are men, that is, because they are animals with a certain physiological organization, all men and all groups feel certain universal human needs, like the craving for food or the hunger for sexual relief. But the ways in which even these basic human needs are satisfied vary indefinitely from group to group. They are a part of the group culture. When a man shall eat, how often, how much, under what circumstances, with what ceremonies, and what particular foods, are all a part of the social habits learned by the child. With whom and with how many a man shall satisfy his sexual urges, on what conditions, after what rites, for how long, and even, if recent psychological experiments may be trusted, with which sex, are all parts of a par-

ticular culture. In these respects it almost seems that every conceivable arrangement has been tried by some group, and has worked with sufficient satisfaction to be preserved for long periods. And every one of these arrangements and cultures has been regarded by those who practiced it as the only natural and conceivable and right way of acting.

So interrelated are all these customs and beliefs that it is very difficult to isolate one from the entire mass. When a new force alters a single accustomed way of doing things, it is bound to cause reverberations in all the rest, as we can observe in our own changing civilization. Yet when the anthropologist tries to analyze a culture into its component elements, he finds that every social group possesses a set of arrangements for satisfying each of its varied needs. Thus every group has fixed patterns regulating the production of children, and its contacts with other groups. These arrangements are very complex things: they comprise not only a whole mass of detailed customs as to how men shall act, but they also prescribe just what they shall do, how they shall feel toward their fellows and toward the enterprise they are engaged in, and what they shall believe about the whole matter. Such an arrangement with its attendant feelings and beliefs and prescribed ends is known as an "institution." The term is flexible, being employed to denote such vast sets of habit and belief as art or religion, and also the more limited patterns that determine how men in particular cultures shall act, like science or marriage.

If we ask what it is that causes these diverse group cultures to take the forms they do, what are the roots of any culture, we find that every culture is moulded by

three great factors. There is first of all the physical environment in which the group lives. It gives rise not only to such obviously different techniques as distinguish the Eskimos with their snow or skin houses, their fur clothes and diet of fatty meats, from the Arabs who live in tents, pass their days on horseback, and subsist on the products of their herds. It is responsible also for much of the subtle difference that sets off English life in Canada or Australia from English life in Great Britain. There is secondly human nature, the human material that is adapted to these varying environments, and by its universal biological needs and impulses sets the general pattern to which we find all cultures conforming. There is thirdly the particular social heritage that largely as the result of historical accident has come to determine how a people shall act and think. Thus though equally good clay is available all over North America, the tribes of the southern part of the continent learned how to use it to make pottery, and their knowledge spread to their neighbors, while those of the Northwest never practiced the craft. In identical environments the Eskimos of America build snow huts, use the dog to drag their sledges, and hunt reindeer; the Chuckchee of Siberia drag with them heavy wooden and skin tents and harness the reindeer. These differences are due to historical accidents in the past, just like the fact that the United States was settled first by Protestants, and has lately received large numbers of Catholics; or that the Persians, the Arabs, and modern Europeans appreciated and developed Greek science, and the Romans and Europeans of the early middle ages did not. Of these three factors, so far as the anthropologist can find, it is human nature

that in its potentialities remains fairly uniform the world over, and holds different cultures to variants of a single broad pattern. It is the varying physical environments, and above all the wealth of specific invention in technique, social arrangement, and idea, spread from group to group by more or less chance contact, that have led to the contrasting tapestries of group life.

The physical environment influences a culture in two ways. Most important of all, it provides the particular materials with which men satisfy their basic needs. The Eskimos are an astounding example of how a group living under conditions most of us would regard as extremely unfavorable have found in their meager surroundings materials to build all they need for a complete life. Cut off from most of the essential contacts with other tribes through which come new ideas, for sheer inventiveness the Eskimos as a group know few rivals. What they have done with the bones and hides of the few animals in their habitat, with the snow and ice and the meager stunted vegetation amidst which they live, in making not only all the necessary implements to gain food and shelter, but in satisfying the urge for beauty as well, might well shame many a tribe of the opulent tropics. But not only does man's environment furnish him physical materials; it gives also the experiences around which he builds up his ideas, the symbols of his imagination, like the snow and ice of the Norse hell or the fiery torments of the infernos of Eastern deserts, the materials for poetry and song and story, the motifs of his art, the figures of his religious experience, and the very rational order of nature on which he builds his science.

Man's environment lends materials he has learned how to use with remarkable skill; it also sets limits beyond which he cannot pass. Primitive man had to live near a food supply; agricultural populations in particular are rooted to fertile soil. The Eskimos are forever shut off from wood-carving and textiles and growing grain; the savages of the Amazon can never use carts or horses or cattle, iron weapons or birch-bark canoes. For all their wisdom, the Chinese were cut off from fruitful contact with Greek science or philosophy; Europeans could not hear the message of Buddha, or the common sense of Confucius. Egyptian civilization never reached the British Isles, nor did the galleys of the Phoenicians or Romans carry on commerce with the American Indians. Russians felt no Renaissance, and Islam knew no Age of Reason.

The result of the science and invention that has transformed modern Europe has been to minimize all these differentiating effects of man's environment. The limits formerly set to man's activities by his immediate environment have for our civilization been pushed back till they are now as broad as the world. Materials to be found anywhere on the globe are now available for all men everywhere. There is now no place where if men really want to they cannot live the life of Western Europe. There is no natural resource, no idea, no custom, no artistic symbol that if he wills the Westerner cannot make his own. It is doubtful if anything can stand in the way of the world-wide spread of a common material culture, with factories, steam-engines, motor-cars, and all their train equally used in every corner of the globe. Such systems of ideas as natural science and such social faiths as economic

liberalism or nationalism or communism will soon be equally at home on every soil. Already the environment has ceased to set gross limitations to human endeavor, and instead causes such minute economic specialization as is centering the automobile business in Michigan, the movie industry in Hollywood, and the steel mills along the southern shores of the Great Lakes. When modern technology has really forced the removal of all artificial barriers like tariffs, though different districts will specialize in their products, men will everywhere use the same machinery of living. What will alone differentiate cultures will be, not the environment, but the particular historic pasts which groups of men have lived. Though they share a common science and a common social structure, for years to come Europe will look back to Christianity as India to the Hindu wisdom and China to the centuries of Confucius.

But science and technology have changed our life not only by giving it world-wide scope: they have created a new artificial environment, the mechanical city. Where modern cities arise using all our invented techniques, they induce the world over the same modes of life and the same breaks with the institutions and ideas of the past. The problems facing such traditional forms as the family and art and religion in the West are much like those they face in China or India or Angora; the contemporary tendencies in every industrial environment, so far as the observer can see, are the same. Man has built himself a new world to live in; and quite naturally though unintentionally he is forced to transform all his old ways to adapt himself to it. Everywhere the new environment has penetrated,

the old adjustment has been thrown out of balance. Everywhere men are groping toward the same mechanized and socialized life. Everywhere women are forsaking the home, and undermining the old forms of marriage. Everywhere factory workers are facing the same problems of resistance and control.

Taking his clue from the discoveries of experimental biology, the psychologist has thrown a flood of light on the second great factor in culture building, the raw material furnished by human nature. He has come to look upon man as essentially a biological organism, a complex organization of living cells whose functioning is loosely coördinated, chiefly by the nervous system. At birth infants are largely bundles of capacities and potentialities for the acquisition of an indefinite number of habits. As they grow they are naturally forced into the social pattern that prevails in their home. The Blackfoot Indian boy learns to ride and dance and hunt game, to accept the tribal arrangement of marriage and property, to perform the tribal crafts and have the tribal religious visions, to believe implicitly the tribal lore. The French boy learns to read and write, to be a professing Catholic, to believe in science and the French Revolution and French glory, to carry on the family, to acquire a mistress, the French lucidity of expression, and the Latin temperament. Exchange the two boys at birth, and the French baby would grow up a good Indian while the Indian became a perfect Parisian. All the elements we can distinguish in human nature,—will, temperament, character, personality, conscience, mind, soul, intelligence,—are to the psychologist not things that are possessed, but the complex organizations of human behavior, the acquired

habits of responding to certain stimuli learned by contact with the group in which the man lives.

Such a way of looking at human nature does not reveal the value which men can give their lives by developing one moral character rather than another, or by acquiring a critical and imaginative habit of mind. But it does make clear that whatever potentialities are brought by a child into the world are at every turn moulded, stunted or developed by the group culture that provides the channels through which they are organized. Had a Newton or a Darwin been born amidst the Eskimos, he might have grown up to invent a new method of hunting walrus or introduce a new plant as food. Had a St. Francis or a Savonarola appeared on the Congo, he might have started a new society of religious dancers or led a crusade against the scorners of witch-doctors. Without the accumulated ideas of the scientific tradition, there could be no scientific genius; without the rich Christian past there could be no Christian humility or righteous wrath. The very type of character or mind that can appear in any group is determined by the cultural tradition that can alone develop it.

That human nature sets certain limits to what men can become is obvious. Any culture must provide for satisfying hunger, for requisite shelter, for ordering the sex life and rearing children, for releasing the artistic urge, for feeding the imagination and giving expression to the emotions. These impulses are met constantly wherever men appear. And it is fairly well established that men differ in their individual capacities, that some can never paint or sing, that others can never get along with their fellows without friction, invent

a new idea, or solve an unaccustomed problem. How far these universal impulses of man are inborn, how far they are habits caused by a common environment and experience; how far these individual capacities are definitely fixed, how far they too are learned in early childhood, psychologists and biologists do not yet know. They have fought bitterly over their many theories; but for our purposes it is enough to know that whatever the limits set by heredity or by the hitherto universal traits of human nature, the outstanding fact about man is the unending variety of the forms of life to which he can adapt himself. Even primitive men, with little resources of technical skill and no command over natural powers, have been found living in every environment and with every conceivable social arrangement, every imaginable type of belief. It is just this remarkable adaptability of human nature, the way in which men have always succeeded in devising a manner of life no matter what the conditions, that is the ground for hope that men can make an unprecedented adjustment to a mechanical life and a critical, reflective mental attitude that have never been in the world before. To live in a modern city, to carry on the sustained intelligent investigation that is necessary if we are to solve our problems, are tasks men have never heretofore been called upon to perform. Yet if we are forced to confess failure, it will be the first time men have been unable to adapt themselves to the conditions of their lives. And even if we cannot solve our economic and political problems, as the Romans could not solve theirs, there is little doubt that we too could develop as rich and satisfying a world to console us as they builded in Christianity. We might well

in that event turn to Spinoza and his scientific vision of the immutable and undeviating order of nature.

The human nature that must put on innumerable habits and learn to play its part in the life of its group always finds an existing culture to mould and organize it. To the anthropologist, this cultural heritage consists of two sorts of custom. Men find they must adapt themselves to the folkways of their kind, and they must accept the folklore that is in vogue. They thus learn both what to do, and what to think. The utmost reaches of creative originality can do no more than slightly modify the folkways under which a man has grown up, or the folklore he has learned is true. Thus in our older civilization it was a folkway to attend church on Sunday and listen to the preaching of the truth. Those who did not were beyond the pale of respectability. Even when men have become intellectually convinced of the falsity of the old religious beliefs, one has only to look around one to ascertain, they cannot escape this folkway. They feel uneasy until they have found a group of fellow doubters with whom they can hold Sunday meetings. Our cities are full of such extra-Christian religious gatherings. Even the atheists are not satisfied until they have hired a hall, secured a lecturer, and can meet to hear the promulgation of the new gospel that is to save the world.

These folkways both prescribe the actions that shall be followed and detail the correct way in which they shall be performed. Thus in our new industrial civilization there has arisen the folkway of playing golf. One who values his business prestige must belong to a country club and make a pretense at least of playing at golf. He is out of it if he does not. But golf carries with

it a prescribed set of regulations. There must be a certain uniform, a certain ritual of motoring out, hiring a caddie, observing the amenities, behaving in the locker room, dining at the club; and he who fails to come up to expectations in any of these matters is worse off than if he had not made a golf club at all. That eccentricity might be forgiven him; but failure to observe good form is unpardonable. It is just the same with fighting for an Indian, public-speaking for the Athenian citizen, or getting married for the small-town American. One who omits a marriage ceremony, or even deviates from the allowed procedure, is lost.

The folkways prescribe how men shall act; the folklore, what they shall believe. Every culture contains several types of accepted belief. Most sacred are the traditional ideas handed down from the past, dealing with mythological notions, moral and social standards, or the elements of beauty. Thus in our older civilization, men were expected to believe in the existence of a loving and good personal God, and in the necessity of somehow finding salvation from the fiery hell of his wrath; in the sinfulness of all sexual experience not blessed by a clergyman, in the supreme value of personal freedom, in the glory of dying for one's country, in the Sermon on the Mount, in democracy, and in the right of a business man to do what he likes with his own; that a painting should be an accurate portrayal of its object, and that a novel of married life should not. Men found no difficulty in believing all these things at once; for they were the accepted folklore.

Secondly, folklore includes "common sense,"—beliefs more or less checked by average experience, and in simpler societies embodied in proverbs and sayings,

like "Spare the rod and spoil the child," "Rain before seven, clear before eleven," "Woman is ever fickle." Thus every man of sense knows that honesty is the best policy, that one should set a thief to catch a thief, that all politicians are scoundrels, and that the American Constitution is the most perfect instrument of government ever devised.

There are, thirdly, a whole host of techniques for the practical handling of the environment, like the hunting and agricultural knowledge possessed by primitive groups. Here it might seem that erroneous ideas would speedily reveal themselves; but civilized men have always been amazed how many absurd notions, like planting in the full of the moon or spitting on the bait or bullet, are shared by the most skillful craftsmen. Most American engineers feel that all technological advance is bound up with private enterprise; many psychiatrists unhesitatingly accept the theories of Freud.

Finally, a developed culture will contain a highly organized system of beliefs founded on certain basic assumptions and held rigidly to certain tests. The Greeks had Euclidean geometry and Ptolemaic astronomy; the 13th century had its Aristotelian metaphysics and theology; the 18th century had its Newtonian mechanics; we have our natural science; and the Chinese had the moral code of Confucius. Such systems are the result of a rationalization of traditional lore, in some cases checked up by the method employed in the practical craftmanship.

These are the elements found in some form in every culture. How highly developed they must be before we call that culture a civilization, is an arbitrary mat-

ter. It is usually held that to be civilized a people must lead a settled life, till the soil, have gathered into towns, have an economic structure that has carried to some length the division of labor, have some form of political organization into states, and have developed a form of writing that can leave a permanent record of ideas. Certainly the great civilizations of the past and present have all possessed at least these characteristics. They have varied even more widely than have simpler cultures. Thus existing side by side were the civilizations of the ancient Greeks and the Persians: the one a minor commercial rivalry of quarreling petty city-states, the other a vast military empire founded on agriculture; the one reaching heights of individual achievement in art and thought, the other essentially a group life dominated by a priestly caste. Yet for all that, these civilizations of the past, like the Oriental civilizations of to-day, seem much alike when compared with the new civilization first developed in Western Europe. Already the time has come when we feel that no society without a flourishing industrial system and an appreciation for science can call itself truly civilized. It will not be long before the whole world looks back from its achieved "civilization" to the essentially "primitive" life of the Greeks, the Romans, the Hindus, the 19th century Europeans, and the Chinese. Into that new civilization will be woven strains from all those earlier cultures, just as our old Christian culture contained survivals from the more primitive tribal folkways of the ancient Hebrews and the barbarian Germanic groups. Yet it will not be surprising if men then put on the same level the Norse or Congo mythologies and Christian theology, and talk of the

quaint ways of the country dwellers of the 12th and the 19th centuries. All that is specifically Christian and European may well by that time have been overshadowed by the reconstructed tradition of Chinese social morality and Japanese art. In such ways do cultures give way to new cultures, and civilizations change and grow into other forms of life.

III

WHERE OUR CIVILIZATION CAME FROM

Every group culture has been built up slowly for generations, as men with their imperious needs for food and shelter and love and sociability and shared feeling and beauty and imagination and understanding have painfully and hesitatingly sought to bend the materials nature offered them to the service of a satisfying life. How the first crude steps were taken we shall in all probability never know. The origins of the social arrangements, the arts and crafts, the ideas and the universal feelings found in every human group, no matter how "primitive," are shrouded in darkness. We can still chance on scattered bones, a skull here and there, that take us back a hundred thousand years and more; we can dig up the few durable objects that still lie in ancient tombs or beside long extinguished fires. Now and again we come upon records of that past still fresh, like the lifelike paintings in the caves of France and Spain. But of what we have called the culture of those far-off men, what manner of life they lived, what they thought and felt and believed, how they ordered the simplest relations of group life, we know literally nothing. Such things cannot be found surviving in ashes or caverns. How can we hope to learn the story of those ages of slow invention, when even of great civilizations we have left only imposing monuments, whose construction must have called for a

high degree of craftsmanship and a remarkable social coöperation, to puzzle us with little hope of answer? Stand in the wind-swept fields of Breton Carnac by the sea, and reflect on those miles of huge stones, row on row set on end. Chance on the mounds and temples that lie in impenetrable jungle along the coasts of Yucatan and Guatemala. Look at the great stone figures on Easter Island in the midst of the Pacific. What civilizations built them? What life was led here? We cannot say.

The origins of by far the larger part of the institutions that still shape our civilization, the technical inventions that our science has but improved upon, the ideas that still furnish the fundamental forms of our most highly developed thought, are lost in this dim, remote past. We do not know when or where or by whom language was developed, or writing and the alphabet devised; fire adapted to human use, or tools employed; pottery and weaving discovered, or metals smelted; animals domesticated, or grain cultivated. We do not know how government or marriage came into being; how religion undertook to organize men's emotions, how myth peopled the imagination. We do not know whence we derive the notion of causality, or the habits of inference; how things and their qualities were set off, how what is actual was distinguished from the dreamed, the remembered, the imagined. By the side of the achievements we find every human group has mastered, those inventions we can date and attribute to certain peoples seem but the easy modifications of the really revolutionary and original discoveries. We do not even know whether far greater crafts and ideas than we possess may not have been once gained and

then blotted out completely. From what we can observe in historic times we may believe that any valuable discovery will be preserved and embedded in new cultures; but we cannot feel sure. We know of crafts, like the staining of glass, that have had to be rediscovered; we know how for centuries the thought of the Greeks was lost to the West. The notion of a Golden Age from which men have degenerated, of an eternal recurrence of slow forgetting, is one of the oldest we possess; for all we can tell it may have had some basis in fact. Only the discredited and easy optimism of 19th century faith in progress and evolution stands in the way; and that was based on the material accumulations of a scant four centuries in one corner of the globe.

In fact, the only major institutions of our civilization whose origin and history can be traced with any certainty are science and its application to technology. The others we can follow back into the past through a few of their vicissitudes; then we must stop. In the remoter parts of the earth there were still, until the 19th century, many groups of men whose life was much less complex than the culture found in the great civilizations. If we fancy, we can please ourselves by imagining that such groups lived a life more "primitive" than our own. They certainly had not known the distinctive achievements of the last thousand years of European civilization; but beyond that we have no knowledge of their history. Whether, as the one scientific mythology of the evolutionary anthropologists had it, their institutions were literally "primitive," in the sense that they had remained in a stage of development beyond which the more complicated cultures had

passed, and that they could serve as examples of what our own past had been; or whether, as the other school of scientific mythologists believed, they were rather the isolated and degenerate remnants of a once widespread civilization, centering, perhaps, in Egypt or in the lost Atlantis, the wise man cannot determine. Both guesses are equally good; both are probably equally wide of the unknown facts. There is no reason to think that any group of men has had a longer human past than any other; or that any one culture has had less time to adapt itself to the conditions of its environment than another. The men of the Old Stone Age in Europe, who for all we know may have furnished part of our ancestry, undoubtedly lived a life far more unlike that of Australian blackfellows or Congo negroes or Eskimos than those groups are to-day unlike each other. In the measure that we can understand complex phenomena by observing simpler instances, we are probably helped by studying "primitive" tribes; but we are probably misled as much as we are enlightened if we try to reconstruct from them our own past.

All we can really do is to trace back our own institutions and ideas as far as we have certain record. We can thus see a few of the modifications that have overtaken our culture; not enough to find them in any but a very complicated and "developed" state, but enough to come to certain conclusions about the way in which such change takes place. We have a fair record of the state of European civilization before the coming of science and commercial expansion; we have a record of about a thousand years of life around the Mediterranean after the 5th century B. C. The latter is important because the culture there developed has furnished

a storehouse of materials on which our own civilization has from time to time drawn for ideas and inspiration. But of the sources of the social and economic institutions of pre-industrial Europe we have little knowledge. In a general way we can tell what Western civilization was by the 13th century, and we do know in considerable detail the new forces that are transforming it into something else. The rest is inference, guesswork, and imagination.

Comparing what we know about the life of mediæval Europe with the scanty information we have about life in the early civilizations of Egypt and Mesopotamia, or in the Oriental civilizations of India and China, one conclusion seems reasonably sure. It is that the old civilization of Western Europe was an unusually composite affair, a patchwork of pieces drawn from a wide variety of sources and continually subject to the effects of new influences from its neighbors. The other great historic civilizations were much more self-contained, that of Western Asia alone approaching it in its receptivity. Quite naturally therefore those civilizations after a few millennia seemed to reach a certain equilibrium. They no longer produced startlingly new ideas or made new technical discoveries. They had fairly well worked out the refinements of their own cultural heritage. Thus Chinese life around the 9th, 10th, and 11th centuries, after it had assimilated the foreign impulse of Buddhism, reached a richness of intellectual and artistic development that has not since been surpassed. Hindu life remains, as we say, "without much history" from the time when Alexander introduced certain Greek notions to the coming of the Moslems in the 16th century.

The civilization of the Mediterranean basin, and of the Western Europeans who later appropriated part of it, was not so static and unchanging. It has been more "progressive," and has eventually found the new institutions of science and technology that are now transforming every civilization alike. In the last analysis this was not due to any inherent genius of the peoples concerned, certainly not to any particular superiority of the Christian religion. It seems rather due partly to the remarkable variety of local cultures which converged around the great highroad of the Mediterranean, partly to the resulting commercial development which by ultimately forcing a common political system in the Roman Empire gave opportunity for the assimilation of all these cultures in a very complex and rich civilization, and partly to the fact that through fortunate contacts Western Europe discovered this rich civilization slowly and in a succession of stages, and thus had no time itself to crystallize. Had the conflicting elements of Hellenistic life been less contradictory, ranging as they did from the sheerest Egyptian or Asiatic mystical and theocratic religion to the scientific and political thought of the Greeks, the Mediterranean culture might easily have settled into the uniform life of China or India. Where the disturbing elements were forgotten and the conflicts ironed out, as in the Byzantine Empire, it did. Had Europe received this civilization all at once, instead of getting it bit by bit from the Romans, from the Moslems, and from contact with the written records, it might like Arabian culture have had a brief burst of energy and then have settled down to an unchanging and satisfactorily adjusted life. But as it was each new

contact, each new wave of influence from classical antiquity, kept Europe in a state of perpetual ferment.

In consequence, our civilization has been continually faced with the problem of fitting some new idea or force into its traditions. It has confronted one need for inventing a reconciliation of old and new after another. It has never ceased to play the role of the modernist who has to devise an elaborate system of ideas or a complicated set of institutions that will embrace novel, alien and incompatible elements without giving up the time-honored wisdom of the fathers. There has never been a time, save in the so-called "dark ages," when the struggle to keep alive by rude agriculture absorbed all energy, when Christendom has not found religion and science in bitter conflict. There has never been a time when Western artists have not had to assimilate new artistic standards into a classical tradition. Once, in the 13th century, men had almost created a well-rounded Christian civilization; and some of us look back longingly at that age that seems in retrospect to have solved most of its conflicts. But we must not forget that had that society remained stable, we should not to-day possess our most cherished achievements; and that the whole of modern history, in all its excess of irresponsible freedom seeking, has been just the rebellion against such a static world.

Westerners have lived ever in the midst of struggles and conflict, feeling always that their world was disintegrating under the impact of new forces, that they were facing insoluble problems of adjustment. That is why they have been forced to be inventive and inquiring, seeking some new discovery or some new form of social life. It is of such struggle, such attempts at

harmonization, that the new and richer is always born. And it is just because our past has been one long record of groping for some way to live in a new world that has threatened all the established verities, that we are able to look with hope upon the disruptive forces of modern science and technology. Unless they are to have an effect quite different from the intruding forces in our past, far from destroying our society we can well hope that in the very difficulties they present they will compel us to build a richer life than that we have hitherto known.

It almost seems that we Westerners have invented nothing, but have borrowed all we possess. Not an idea, not an institution, but has come to us from without, and has been at first an unsettling alien factor. Our originality has lain in the new combinations we have been forced to make. Our well-tried wisdom has always failed us; against our wills we have been driven to criticise and invent, to turn to intelligent investigation. Our conservatives have never triumphed; they have always had to give way in the end. In this we have resembled the Greeks who have so often inspired us. They too came as a simple and "primitive" people into the complex Ægean world; they too at first could only wreck it and scatter its treasures. They freely admitted they had originated nothing. Every element of their life, from writing to art and religion, they borrowed from those who had worked them out before. Yet out of the need of rather consciously building a civilization of plundered fragments they developed an admiration for intelligence and the life of reason that had not before been known. Is it too much to hope that, face to face with the similar need of

building a new civilization on the wreck of the old Christian, agricultural world, we also can eventually achieve a respect for intelligence and wisdom that will give us a new life of reason? Americans, who have gone farthest in destroying the old civilization, who just because they are not too deeply entangled in it are most free to take from it only what is really valuable, and build a new structure on the basis of science and the machine, need not too easily despair. They may be fated to be the Athenians of the new world.

It is just because our civilization is the heir of many ages and is scarred by the struggles of the past, just because it has been woven from a host of different elements, each one of which has left its mark, that it is almost impossible to understand it without knowing the conflicts through which it has passed. Who without an acquaintance with history could possibly comprehend the superficially bizarre picture presented by American Protestant Fundamentalism? Was there ever a set of beliefs so passionately defended, a faith that means so much to its millions of adherents, that clashed more loudly with the main currents of a national life? It takes all our knowledge of the decaying Roman world in which Christianity arose, of the humane and yet oppressive mediæval faith, against which the Protestants rebelled, of the scorn of 18th century rationalism for all religion, of the great revivals that carried evangelical Protestantism to the backwoods of America, of the steady inroads of scientific ideas and the morals of opulence, to make Fundamentalism seem other than a fantastic nightmare. Or who that was limited to the present scene could find rhyme or reason in the strange contradictions between

our economic and political ideas of liberty and democracy and the industrial feudalism in which we live?

If we try to trace the roots of a single one of our contemporary institutions, we find them leading back to a dozen different ages and peoples, stamped by all the great struggles our forefathers fought. Take our political life, to-day rather despairingly striving to keep alive some semblance of the democratic ideal in a world of industrial absolutism. We find ourselves now denouncing the Constitution and the reactionary decisions of the Supreme Court that override the clearly expressed enactments of our duly elected legislators, now crying aloud for our ancient constitutional rights to think and drink as we please which mob hysteria or terrorized and venal legislatures have infringed. In one breath we talk of the will of the people and its defeat by organized interests, and in the next of the impossibility of bringing expert knowledge to bear on governmental problems so long as the mass of men are morons who will listen to none but demagogues. Each of these moods represents a principle for which men have died in the past.

Our most recent political movements have tried to secure social legislation to control and in a measure guide the forces of a complex industrial civilization. They have faced the difficult task of solving with trained intelligence the class conflicts and urban problems of the machine age in a way that will satisfy the inarticulate wishes of the masses of men. At every turn they have run against the sheer resistance of the political tradition of the constitution builders of the 18th century, who left us governmental machinery carefully planned to make any control or guidance of

business by governments impossible. They have encountered the still vigorous opposition of the agrarian frontier democracy of the Jacksonian era, with all its distrust of the expert and all its faith in the ability of the common man to administer any office. To understand why the idea of inviolable rights, now so successfully invoked by business corporations against social legislation, is still so strong that it can bring millions to support reactionary programs, we must remember the long hard struggle fought from the 16th century on for freedom from the tyrannical rule of bureaucratic monarchies. To realize why business men are so jealous of their right to make money as they please we must recall the great rebellions, first against the outworn regulations of decaying mediæval guilds, then against the well-meaning but blundering and conservative paternalistic absolutisms that succeeded them. It is naturally difficult to fight for centuries to free business from all external control, and then overnight, merely because factories have arisen and men are at the mercy of entrenched economic power, to welcome such control with open arms and minds. No wonder the Germans have clung passionately to their long tradition of acquiescence in the skilled rule of men who, like Frederick the Great, proclaimed themselves "the first servant of the state," even though their modern heirs are rather servants of investors and merchants and employ the resources of science in sending their subjects to slaughter in the most efficient and up-to-date manner. No wonder we ourselves are puzzled and waver between denouncing the 18th Amendment and calling on the First and Sixth, since we are trying to practice both a democracy that believes in the popular

sovereignty bought with blood in the French Revolution, and a freedom from oppressive majorities that men fought for under Charles I and James II. It is a little hard to sweep away every obstacle to the will of the people and at the same time to defend your home as a castle against the popular will.

Or if we are appalled as we contemplate the havoc caused by irresponsible sovereign states claiming the right to murder their neighbors over oil or coal, and shrink from a patriotism that enlists righteous men in the service of scoundrels, it is not hard to understand how millions are still willing to die for the pitiful slogan, "My country right or wrong." We have only to remember the noble passion that swept the people of France across Europe to strike off the chains of the oppressed still groaning under the sway of tyrants, or the like passion that drove those oppressed to a white-hot enthusiasm as they defended their homes and monarchs against an alien invader turned oppressor himself. If we are saddened to see new nations ruthlessly trampling underfoot the peoples unfortunate enough to live within their boundaries, and sending forth armies for more of their neighbors' land, we cannot forget the generous and disinterested patriots who during the 19th century stirred up hatreds and ambitions and greed in their revulsion from the degradation of their own peoples. And if the very idea of national sovereignty seems to cut across all we care for most to-day, the long fight to free Europe from the dominance of the Papacy, that sent men in the Renaissance to the excesses of irresponsible national independence indulged in ever since, may help to ex-

plain why even now any limitations upon sovereignty seem unthinkable.

These political institutions take us back to the revolt from the middle ages; but more ancient customs and beliefs, like those that determine our moral and religious life, stretch much further into the past. In the little village church, where men are warned to keep their sons from the contamination of college education, there are echoes of the great evangelical revivals that a hundred years ago saved America from science and atheism, and still earlier echoes of the Luther who protested at the licentious life of the Renaissance and thundered against reason as "that Devil's bride, that harlot, God's worst enemy"; of the mediæval hermits who denounced all learning as the snare of Satan, and of the Roman Tertullian who believed because it was absurd. In the gospel tent where the second coming of Christ and the end of the world are daily awaited there is preached a message that was voiced by English sects in the Great Rebellion, who read it in the records of the early Christians, who inherited it from despairing Jews who had learned it of the seers of Babylon. And the apocalyptic imagery in which the approaching millennium is described goes back to the Persians who long before Christ were hourly expecting the world to be made new. From whom they learned it we do not know.

Or consider the cultured priest who talks suavely and with enviable erudition of all modern ideas and movements, shows how Mother Church offers all that is true in them, and skillfully makes their non-Catholic adherents seem faintly ridiculous. His lineage runs

back to the great scholastics who turned Aristotle's clear scientific thought into a Christian theology of angels, and behind them to the Alexandrian scholars who discovered that Plato was but Moses speaking Greek, and that Greek philosophy was all contained in the Word of God incarnate in Jesus Christ.

Wherever we turn, we find ourselves led back to England and France, to Germany and Italy, to Rome and Greece and Palestine and Persia and Egypt. Nomads of the desert, dwellers in Athens and Alexandria, hunting tribes in the European forests, fishermen of the North Sea; the worlds of the Persians and the Hebrews, of the Greeks and the Romans, of the Arabs and the Christians and the Jews, of Italian and German merchants, of French and English peasants,—all these have given ideas and ways of living to modern America. Take away one of these ages and peoples, and our own civilization would be the poorer. All have played their part in giving us our culture. If racially America is the home of all the peoples of Europe, in its ideas and institutions it has drawn on a far wider store of materials. From as far as India we have borrowed wisdom and error, much of our science and perhaps more of our religion. Only the Eastern lands of China and Japan have been without much influence upon us; and even from China came printing and the compass and a host of other practical inventions, while our porcelain and silks and floor coverings, as well as our modern art, are the fruits of commerce with the crafts of China and Japan. We call our civilization Western, and proudly carry it to the Orient. In fact we are but repaying debts long overdue.

Moreover, with whatever bit of our own life we

start, we find it entangled in the major waves of cultural energy of the last eight hundred years. We cannot escape the middle ages, however remote they may seem to the bustling cities of our own land. From them came much of our religious faith and of our moral ideals; and most of our more recent passion for freedom and individualism and irresponsibility in social action are the fruit of our long reaction against the close-knit structure of mediæval life. The Renaissance is still with us in our artistic standards, in our educational aims of liberal culture, in the pattern of the gentleman, in our passion for the thought and ideals of the Greeks. The Reformation has deeply stamped not only our religious life, but our moral and economic tradition as well; it still decides our elections. The great scientific faith of the Age of Reason, its generous humanitarian sentiments, were never so strong as to-day. The political and social ideas of that time, and the revolutions against feudalism and absolute monarchy, still grievously interfere with a realistic facing of modern problems. From the Romantic movement come more immediately not only our artistic prejudices, but also our religious professions and much of our cult of self-expression and personality. And the Industrial Revolution and the steady march of evolutionary science are remoulding our lives. We cannot trace out the long history of our present institutions; but we can examine these great outbursts of rebellion and aspiration, to see how they have crystallized into the ways of thought and life we find all too inadequate and cramping to-day. Let us turn, then, to the old Christian world of the middle ages, to see what manner of life men led in it, and then consider the major

changes that never so rapidly as now have altered it almost beyond recognition. With a clearer knowledge of what that world was like, and why men have abandoned so much of it the while they cling desperately to the rest, we can judge the more wisely when we are called upon to reconstruct it once more.

IV

THE OLD CIVILIZATION AND ITS FORMATION

The old civilization of Europe that took form in the middle ages was the achievement of a society of farmers. Even the cities that began to assume importance in the late 12th century were, outside Italy, chiefly overgrown villages, or market-towns serving the surrounding countryside. They were rarely larger than twenty or thirty thousand, and they never contained more than a small fraction of the population. When the last of the invading peoples had settled down,—after the coming of the Scandinavians to England and Normandy in the 10th century there were no more such migrations,—Europeans turned their energies to cultivating the soil, and, as population slowly increased, to clearing more land for crops. For five hundred years after the Moslems in the seventh century cut off commerce with the Eastern Mediterranean and threw the West upon its own resources, there remained large tracts of forest land and uninhabited regions in Western Europe. The settlements were still mainly clearings exposed to the constant fear of the fierce animals of the woods that roamed the streets even of Paris and London. The farmers did not live on their fields, but gathered together in villages for protection against beasts as well as human enemies. These villages clustered around the wooden stockades and blockhouses

of the local lord or chieftain, or perhaps of some monastery. Men virtually lived the life of pioneers. They were not isolated, as in the settlement of the American West, but huddled in small communities; and this fostered a coöperative rather than an independent spirit. But their interests and pursuits were those of pioneering farming groups who had to be ready at a moment's notice to take up arms against some marauding band. As in the New England settlements, the chief social bonds were a common need of defense, and the church.

Europe consisted of thousands of these self-contained communities or manors. Each had a church, a stronghold, and perhaps a mill and a few other craftsmen. There was very little trade, practically none in the essentials of life, and hardly any contact with the outside world. Men lived all their lives within the confines of their own village, except when they went on some freebooting expedition at their lord's behest to a neighboring valley to steal cattle or appropriate more land. The children of the lord might live for a time in the household of a more powerful family. Monks journeyed from monastery to monastery. Even the common man might go on a pilgrimage to some famous religious shrine. But with these few exceptions the villagers troubled themselves little with what went on beyond their narrow horizon. If they had, they would have found that though dialects and customs varied, there was on the whole little to distinguish the group life throughout Europe save the differences in the crops grown in broad climatic belts.

In the typical manor found in most parts of Europe, every man had the right to work for himself on certain

plots of land on condition that he render a certain amount of labor each week on the land of the lord of the manor. He could also secure wood from the manor's forest, and herd his cattle or geese upon the common; and there were numerous special services, such as fighting, which he had to furnish his lord. The produce he surrendered served to support the fighting chiefs and the men under arms with him, and also the monasteries and other religious officials who did not till the soil themselves. But so crude were the agricultural methods that for centuries there was very little left over. Monks had to farm themselves, and fighters had to spend most of their time raising food or at least hunting the abundant game. By the 12th century it was possible to introduce a crude specialization. Enough of a surplus was raised to allow a portion of the monks to devote their time to study, and to support soldiers who lived with the lord and spent most of their time fighting or brawling. It was this slowly accumulating surplus that made possible the first serious intellectual interest, and also permitted men to engage in trade in the market-towns and even to specialize in certain crafts.

With the coming of such division of labor European society emerged from its pioneering period and began to assume the characteristic forms of what we know as mediæval civilization. This great cultural change was well under way by the year 1100, and the next century saw a remarkable social development. In all probability the 12th century renaissance was the most important event in the building of our Western tradition before the coming of science five hundred years later. It far overshadows in significance the later Renaissance

of the 15th and 16th centuries and the succeeding Reformation. These movements were, in fact, but the inevitable fruition of the social tendencies that began in the earlier age. It was the 12th century that saw the rise of the towns and trade and handicrafts and the urban and business spirit that have since waxed so mighty. It saw Europe for the first time pushing out beyond its borders in the expansive and imperialistic ventures of the Crusades. It saw Christianity pass from an alien and little understood religion of escape into a human and worldly force capable of organizing the life of all Christendom; and develop into a well-rounded system of beliefs in which the keenest mind could feel at home in an intelligible universe. It saw the appropriation of much of the philosophic and scientific thought of the ancient world. It saw the building of the great cathedrals, the achievements of sculpture and stained glass, the beginnings of European literatures. In a word, it was in the 12th century that the old Christian civilization was really created out of the needs of an expanding society and the fragments of the earlier traditions of a dozen peoples.

That civilization was founded on the need for mutual protection. All its social institutions grew up, not because men wanted to be free to do as they liked, but because they needed to band together to do anything at all. In the country men had to have a stronghold and a military leader; to guarantee their lives and land they were willing to pay the price of serfdom to a lord, with all it meant of exaction and unwilling service. In his turn the lord had to give security or his privileges vanished. In the city, merchants and, later, craftsmen had to put aside the hope of unlimited free-

dom for private gain before the stern necessity of defense against the perils of jealous and thievish nobles and the unscrupulous rivalry of other cities. What further political organization existed under feudalism had the same basis, the need of lords and towns for mutual protection against other combinations of lords. Hence mediæval society was naturally imbued with a spirit of coöperative loyalty, the same spirit that has brought workingmen together in unions to defend themselves against the economic power of factory owners, in disregard of any meaningless abstract rights of individual liberty. It was shot through with the same bitter conflicts of group with group, the same unscrupulous snatching of any weapon, the same reliance on strong successful leaders, that prevails so often in modern labor movements.

It is easy to see why loyalty to one's group and one's leader should be the outstanding mediæval virtue, and also why the record is so full of treachery and double-dealing. Men's lives had to be regulated by detailed codes if they were to survive at all; and in the absence of any sovereign power to enforce these codes, they had to take on the sanctity of religious duties. Hence quite naturally the church came to throw its spiritual power about the city codes that regulated merchants and handicrafts, and to forbid the commonest types of individual competition possible since the growth of strong central authority; about the code of chivalry that forbade certain obvious forms of treachery to the fighting nobles; and even about the codes establishing the mutual rights and obligations of serfs and lords of the manor. In its turn, if it was to exercise its controlling function in such a society, the church had

to exact unquestioning obedience from all men, and especially from its chosen servants. If that society was to endure, it had to recognize the bonds of mutual obligation, and condemn the scab as a social outcast. If those obligations were to be observed by ignorant men, they had to have the authority and sacredness of a supernatural system behind them. Hence the manorial system that governed farming, the feudal system that united villages loosely, and the guild system with its attendant regulation of trade and industry, were necessarily bound up with a definite religious belief that involved the severest penalties in the hereafter, and a compact and powerful church that could bind and loose those penalties. For the same reason, when the strong governments of modern times had removed the necessity for these defensive group alliances, the first great expression of the new spirit was to turn from the hereafter to the enjoyment of this world, and to break the power of the church's organization. It is only against the high pretensions at social control claimed by mediæval institutions, coupled with their ineffective working in practice, that we can understand our modern spirit of individualism and freedom from responsibility. It is only in the light of the intimate ties that bound religion to the support of a set of economic and political institutions that came to be felt as cramping and intolerable, that we can understand the modern rebellion that since the Reformation has steadily lessened the control of religion over men's real interests and pushed it aside into a secondary realm of its own.

Not till we recognize the utter need for a supernatural sanction for obligations that could not be en-

forced by law or government can we comprehend why this anarchic and vigorous society of fighters and pioneers turned so whole-heartedly to Christianity. So long as Europe lived the simple life of pioneer farmers the old pagan faiths with their glorification of fighting and loyalty and good cheer were a satisfactory expression for men's religious needs. Long after the nominal conversion to Christianity the religion of the dark ages remained for the mass of men just such an exuberant pagan thing. As the religion that had offered to the disillusioned, despairing citizens of the Roman Empire escape from the troubles of the world, Christianity was kept alive mainly by the monks who retreated from this fighting, mining-camp existence. But with the coming in the 12th century of a more complex economic society, with the more extensive social relations that had in some way to be ordered and enforced, a great change overtook Christianity. It came out of the monastery and undertook the task of regulating the world and the flesh. If in the process it inevitably absorbed much of the pagan spirit, relaxed its austere counsel of renunciation to leave the common man his passions and pleasures, and became a great political machine that used its keys to the kingdom of heaven to rule the whole of life, it did succeed in bringing an ordered society out of what had been a chaos. The mediæval church was a far cry from the early Christian communities. But it achieved what that faith of flight from the world could never have done: it organized a civilization.

If we rely merely on the records of the literate monks, we are apt to picture mediæval religion as an other-worldly striving to escape the problems of life

in communion with God. It was in reality no such thing. Mediæval society in its harshness contained plenty of men who longed to flee to a more congenial realm; but the average man was never enamored of saintliness and asceticism. Mediæval religion was what Catholicism still is for the peasant communities of Europe, in Ireland or Italy or Spain, a pageantry of processions and festivals and beauty to be enjoyed gloriously, the natural expression of a very human life. It took the obvious needs of men for group living and idealized them, providing a supernatural motive as its source of control. The records abundantly testify that not even the monastery could long keep otherworldliness alive. It was not the Christian ideals of love and humility and resignation, not the Sermon on the Mount, that answered mediæval needs. It was the priestly monopoly of the grace that could alone save from damnation, that enabled religion to serve as the organizing element in a society that needed organization above everything else. That incidentally Christianity was immensely rich in poetic and imaginative legend, as Judaism, for instance, was not, meant that it gave free scope to the artist. That it embodied a very wise and highly intellectual system of theology incorporating much of the best Greek thought, was an unrivaled challenge to the scholar and scientist. To this day our artistic standards, our love for symbolism and moral significance in art, in spite of the strong counter-current derived from the Greeks at the Renaissance, are due to this Christian world. The very fact that the Christian philosophy provided so satisfying an answer to man's questioning of his universe has made it all the harder to adopt another and scientific way of looking at our world.

Christianity was able to permeate mediæval society in the 12th century because it fitted in so remarkably with the need for social organization and for a common aim to draw men together. The church took these needs and gave them an idealized expression. Out of the quarreling fighting spirit it built chivalry and the knightly service of the weak and suffering. Out of the need for expansion it made the Crusades. Out of the harassed trade and craftmanship of the towns it made the guilds, dedicated to the supplying of the economic needs of man. Out of the craving for artistic expression it created sculpture and stained glass and Gothic architecture and painting, united in the cathedral to the common service of God or the Virgin. Out of the awakening curiosity of agile minds it built the scholastic systems based on Augustine and Aristotle, unrivaled wisdom if one is seeking an understanding of life rather than a control of the forces of nature. Out of the bitter need for mutual dependence it carved the great ideal of a functionally unified society, a civilization in which all men, each in his own vocation, should work together to make possible a rich life for their brothers. It held up the vision of a life in which peasants should raise food and lords protect peasants, merchants supply goods and craftsmen make them, artists create beauty and scholars find truth, monks pray to gain spiritual inspiration and priests give wise guidance and forgiveness. Thus each group was to play its appointed role in the common imitation of God's perfection by drawing all men together in a divine unity of mankind. It is a tribute to the power of this supreme mediæval ideal that as we look back to-day from our social conflicts, though our functions have

changed and multiplied, we can still find no more worthy ideal to aim at than this same striving to contribute our share to the common life of humanity.

When we find a unity of diverse elements in this civilization of the Christian 13th century, we are not thinking merely of the social coöperation forced upon men in troubled times, nor of the way in which these natural needs were idealized by Christianity into an appealing vision of a unified and harmonious Christendom. We are caught rather by the way in which all the institutions of this life fitted into each other with few of the glaring conflicts that have plagued us since. In that society the struggle between traditional faith and newer knowledge had not yet begun. Rich variety of views there was, but religion was still flexible enough to embrace the vital interests of every type of man. Nor was there as yet any divorce of the artistic impulse from the world in which the common man lived. Craftsmanship responded naturally to the imaginative vision, and there was a rich poetic world of symbol and feeling that furnished both unlimited materials and an appreciative audience to the artist. Nor did the moral code seem cramping and unsuited to men's needs. There was room for all sorts and conditions, from the hearty fighter who found in chivalry a consecration to high ends to the mystic saint who prayed and sang to God. For those who wished it there was the fierce joy of austerity; for those who longed for full-blooded life there was understanding. And over all was the watchful guidance of the wisest men, trying to apply the best knowledge to the direction of the many estates of society.

Thus for a brief spell at the beginning of Western

civilization there was a reasonable harmony of intelligence and aspiration and feeling and imagination. There was a social synthesis, based on the conception of mutual rights and duties, which reached from peasant village and market-town almost to the union of Christendom under a joint spiritual and temporal rule. There was a moral synthesis that provided for every man in his own way a natural manner of life, building on man's human passions, guiding them, idealizing them, and leading finally to the vision of God which was eternal life. There was an intellectual synthesis in which men were at home in their world, understanding its meaning and significance, and ordering their lives in the light of the best knowledge. This was the world into which came trade and industry and science; and the result has been one long story of disintegration, the selection of certain parts and the rejection of others, radical reinterpretations, and the addition of conflicting elements.

With the growth of richer life in the 12th century, Europe began the long assimilation of the heritage of the ancient world. Step by step men quarried in the past, and unearthed ideas and attitudes they could work into their own life. In each case what appealed to them depended on the stage of social development they had themselves reached. If monks were attracted by Augustine's passionate vision of God before doctors in the universities found Aristotle's clear human wisdom, if the cultured and urbane humanism of Cicero was popular long before the serious mathematical science of the Alexandrians, it was because it took a long development of commercial city life to reach the heights of the best Greek achievements.

Even before the 12th century the first appropriation was made. Augustine's religious and churchly synthesis of the late Roman world had come down to the West as a direct heritage, the main intellectual element in the mediæval tradition. With awakening curiosity the monastic communities naturally turned to elucidate and elaborate what lay nearest at hand. This Augustinian wisdom was itself the Roman reworking of the earlier Platonic faith in an unseen world of the spirit, to which men could attain if they would only forsake the flesh and the senses. It led to the great otherworldly, ascetic, and mystic movements of the 12th and early 13th centuries; it was the philosophy back of the Franciscans. It sent the best men into the cloister to cultivate a type of spirituality and flight from the world appropriate enough in the decaying Roman Empire, but more and more out of harmony with the advancing society of Europe. It produced the nearest approach in our tradition to the passive and quietistic cultivation of the spirit in disregard of more practical concerns that we associate with Hindu life. It has also stamped on our moral code a fear and contempt for the sexual urge that to this day produces its harvest of hypocrites and neurotics.

Hard on the heels of Augustine and the Platonic tradition came the discovery of Aristotle as he was appreciated in the richer culture of Moslem Spain. By the middle of the 13th century a great series of modernists, culminating in Thomas Aquinas and Duns Scotus, had worked Aristotelian science into the teachings of the universities to which thousands of alert and curious minds now flocked. Aristotle starts his most famous work with the sentence, "All men by

nature desire to know." The Aristotelian writings formed a great encyclopedia of human wisdom, leading men, not to heaven, but to the exploration of the possibilities of enjoyment offered by the world. Unlike the natural science that grew up 400 years later, this knowledge did not aim at the description, prediction, and control of natural phenomena. Such science had to wait for the demand for technology, practical techniques of manipulating our environment, that could come only with a developed commercial and industrial life. It aimed rather to give man understanding and enjoyment, the comprehension of the significance of the world and of human life as related to it. It culminated in the vision of truth, that Truth that is the source of all truth, which, said Thomas, is God. It was interested in the why, the purpose, the function and use of things. It was biological and human. It asked, not how things originated, or how they worked, but what they could do, what stones and trees, men and cities were good for. It sought a meaning for man's life in this vast universe. Naturally it was least successful in physics and astronomy, and most in proposing the good life for man. Hence it could be fitted into the human and moral Christian tradition without violent conflict, at the same time that it brought it close to the problems of organizing a complex society. In the *Summa* of Thomas Aquinas there is not a question that occurs to rather highly developed common sense that is not carefully answered. Man's life and the obvious features of his world were all given a meaning connected with the Christian drama of salvation.

It was just because in Augustine and still more in Thomas there was provided a satisfactory intellectual

system, that the working out of any other science was so long delayed. With all queries answered, why bother? A vigorous mind can live in the universe of Augustine; Protestants have done so almost to this day. Sin and grace and salvation, the service of God and the keeping of his commands, all the common stock of worn ideas of orthodox Protestantism, go back to the man who inspired both the Reformation and the evangelical movement. These ideas are largely irrelevant to natural science, but by them men can still order their lives. That is why conservative Protestants have remained intellectually in the world of the 4th century, and have drifted into bitter hostility to the newer set of beliefs. Catholics, too, have paid the inevitable penalty for the success of Thomas. Since his day there has been no really first-class Catholic mind. The Church has remained loyal to the best available knowledge of the 13th century. Hence the religious life of the West has remained entangled in this older science, approaching a fatal breach with rational and experimental beliefs. On the other hand, the precious human wisdom that can guide and control life has been kept the servant of mediæval learning, while our natural science has fought hard to keep its skirts clear of real wisdom. Our modern period has struggled along with aspiration unable to translate itself into achievement, and technical science that does not bring the good life.

Yet Thomas had laid down the rule that between the truths of faith and the natural dictates of reason there can be no conflict, since both come from God. Men who whole-heartedly accepted this dictum could not stop permanently with the mediæval theological

system. Aristotelian science proved the organizing force in the intellectual life of the middle ages. It furnished the framework for Dante's vision, the key to the meaning of the cathedrals. But its trust in reason led on by easy stages to undermine the very faith it was brought in to serve. Thomas himself had traveled far on the road to the pure mathematics of Spinoza. Independent minds, really bred in the spirit of Aristotle, passed on to the Alexandrian science that expressed his spirit and method. Scholasticism had introduced a faith in rational inquiry that inspired the scientific pioneers of the 17th century.

Another type of ancient wisdom the 12th century found in Roman law. When an increasingly complex society required something more than the loose feudal order and tribal custom, men turned to the codified legal system of Justinian's times. From the University of Bologna there came eager lawyers whose ideas, at first systematizing mediæval institutions, ultimately broke down the remains of feudalism and destroyed the decaying guild system. The whole struggle of the middle class of the towns, first for protection from church and nobles, then for inviolable rights against a central government, and finally for the power of governing themselves, was fought until the French Revolution with the powerful weapon of the Roman civil law.

Aristotelian faith in reason proved ultimately fatal to the Christian world-view, and Roman law broke down the institutional forms of the mediæval world. It remained for two additional elements of the ancient culture still further to transform Christian life. When the humanistic attitude and ideals of the ancient city-

states, and the mathematical science of the Alexandrians, were finally assimilated by the West, there were loosed moral and intellectual forces that have waged a long and ultimately successful warfare against the whole of Christian civilization. Both had to wait for city life in Europe to reach a richness where men could appreciate what the Greeks had achieved. When in eager Florence or commercial Venice, or in the opulent towns of South Germany and the Rhine Valley, men were enjoying pleasures and luxuries and the command of material goods, they began to turn with interest to the literatures of the similar city civilizations of the ancient world. Those men too had known the savor of life; they too had faced the problem of ordering well a richly endowed existence. They too had found the natural setting of life too fascinating to flee to the cloister to meditate on God. The rise of such a worldly humanism had been inevitable since the renaissance of the 12th century. The very next generation after Dante's supreme mediæval vision of heaven and hell saw Boccaccio's merchants and priests in wealthy Florence pursuing fair faces, not pure forms. A 12th century cathedral like Chartres might have been a shrine to the Virgin alone; the pretentious edifices of the next two hundred years were built as much in the spirit of "Boost Reims" or "Boost Beauvais" as to serve God. Civic pride and religious devotion were equally strong, and both were as yet harmonious. But with the pushing in of new interests the mediæval concerns faded, until men finally dared ask, "What good are they?" The mediæval shell dropped off, and otherworldliness, spirituality, and supernaturalism, all that the monk had stood for, were revealed as ir-

relevant. In this renaissance of the ancient sense of human power and dignity and worth, men cast off their responsibility to the old institutions of state and manor and guild and church and stood forth as individuals seeking freedom. The old groups were no longer respected. Men had lost the need for protection; they felt mediæval group control only as a cramping hindrance. Self-sufficiency, isolated personal achievement, were what men admired, the type of character of the artistic genius of the Renaissance, of a Leonardo or a Michelangelo. Man was the center of interest; the truths of God of which Thomas spoke and Dante sang were discarded in the hope of more practical human wisdom. Even science, which in the 13th century had culminated in the contemplation of the mystic truth that was God, must now be useful. Prophets of the new age turned eagerly to a science that should not merely rejoice the understanding, but should render men the masters and possessors of nature, and extend the bounds of human empire to the effecting of all things possible. For four hundred years men had been learning to appreciate the naturalism of Greek thought, its essentially secular, civic and social ideals, its religion of devotion to the good life lived within a state, its application of the artistic standards of measure and skill and beauty rather than the Hebrew and Roman call to obedience to law and duty. Now they ceased to do lip-service to the repressions, the resignation, the flight from the world of the later Christian tradition of despair. Men felt with the Greeks that life was an art, a human achievement wrought by skill. They felt pride in men's natural powers, not humility; joy, not love; they sought freedom, not pious obedience, and

turned from contented faith to the eager seeking after more truth.

In this humanism of the Renaissance, the Christian world made its last great raid upon the wealth of ancient culture. Mathematical science was still to be taken; but when three centuries later men renewed what had been a minor mediæval interest in the science of the Alexandrians, the disintegration was already far advanced. Natural science was cultivated in the very different atmosphere of the triumphant commerce; and though its roots too lie in Greece, it came to the West as an almost indigenous product. The Renaissance was the last great episode of the middle ages. It carried to fulfillment the human wisdom of the age of faith. Christianity was still vital enough to absorb the impulses of the rising commercial towns. It was in this time that those Umbrian valleys that have already served as typical of the old civilization received the stamp they retain to this day. The Christian, agricultural world was full-blown.

V

HOW CIVILIZATIONS CHANGE

To the thoughtful observer of mankind nothing is more fascinating than the processes by which social institutions change. How they are pieced together from many bits of custom, how they serve for a time as channels for the impetuous streams of human life, how they finally give way to other habits when the needs they answered have disappeared,—we are never weary of recounting the tale. There is a lure in the ages of cultural transition,—the 5th century in Athens, the dying splendor of the Roman Empire, the ebullience of the Renaissance,—that we do not feel in times of settled prosperity. With the first birth of imaginative interest in their customs, primitive men delight to tell the myths of the fire-maker, the inventor of the bow and arrow, the coming of their alphabet. With a more settled society and a rationalized religion, early peoples venerate the great Lawgivers who came from heaven to teach them how to live. The first serious attempt to understand the passing of religions and ideals, Augustine's *City of God,* was inspired by the tottering Roman Empire. No sooner had the great idea of a natural order in human society dawned on the Age of Reason than men began to write philosophies of history.

Since so much popular interest attaches to cultural change, it is hardly surprising that nowhere else have

the social sciences had to confront more speculation and imaginative theory. To this very day anthropologists are joyously fighting for their chosen explanations. It is still seriously maintained that all civilization came from Egypt, from the People of the Sun; or that there is a fixed and invariable order of development through which every people must pass. The more critical students, however, who take their history first before theorizing, find as little evidence of a single origin for all the arts of civilization as they do of an identical history in every group. To them, the pageantry of changing institutions is a mixture of the invention and diffusion of cultural traits.

Even within historic times it is hard to find well authenticated records of the first appearance of a new custom. Material inventions are easiest to date; but even there when we forsake the patent-office we are plunged into controversies like that surrounding the first printed page. The mystery grows thicker when we ask such simple questions as, who first threw rice at a wedding? who danced the first Morris dance? who ate the first tomato? To find parallels in other cultures half way round the world is easier than to stumble on the birth of a new idea. Most of our record is therefore filled with the story of how diffusion takes place, how a material invention or a religious myth has traveled from group to group. Only when we must rest content with an X do we postulate invention.

The horse and the whole complex of traits that surround his use in North America afford a clear example of cultural diffusion. Europeans introduced the horse in the 16th century; he was unknown to the Indians. There were two foci of spread. From the Atlantic sea-

board his employment as a draught animal followed the settlers slowly over the Appalachians. From the Southwest the Spanish steed complex spread rapidly among the plains Indians. Each focus had its own characteristic customs of harnessing, riding, and tethering. Though the two areas have long overlapped, many of the original differences are still preserved; hardly a habit connected with the horse is the same for the Texas cow-boy and the Ohio farmer.

In such diffusion of cultural traits, that is adopted which finds a ready soil. Wagons and carriages had to wait for roads and trade to develop; Hiawatha had no use for a coach-and-four. But the Indians could appreciate the mobility of the mounted rider on the unbroken prairies. They took to rifles and fire-water as readily as the invaders to canoes and maize. On the other hand, the Indian had as little use for the European's ships as the latter had for the war-dance or the scalp-lock. American cigarettes find a wider market in China than Methodist tracts; Hindu religious cults flourish more profitably in California than Hindu art.

Geographical spread of novel traits occurs either when an invention travels outward from its center, or when some chance contact directs it into a new channel. Out of the tangled variety of outrigger types in the Indian Ocean and Malaysia, students have pieced together a complex story of invention after invention in differing islands, modified by historic trade routes and accidental voyages. The devious paths along which the writings of Aristotle came to mediæval Europe read like a romance. Southern England received its Christianity from Rome, Northumbria from Ireland; there were years of struggle over liturgy and polity. Why did

Calvinism take root in Holland, Scotland, and Hungary? Why is the Napoleonic code observed in Louisiana and not in Quebec? Each of these cultural migrations has behind it much of historical accident.

Even more complex is the course of what we may term temporal diffusion. Some changed condition leads a group to single out a forgotten element in its heritage for new attention. Jacobean England rediscovered Magna Carta; ship money was now more important than the Spanish Armada. Bologna cultivated Roman law. Luther found the Pauline gospel, Calvin the Hebrew legislation, Erasmus the philosophy of Christ. The same modern world sends Catholics back to Thomas and Protestants to the Sermon on the Mount. Republicans rediscover the wisdom of Jefferson. Why did Europe turn first to Augustine, then to Aristotle, then Cicero, and then Archimedes? Why did 19th century Americans build first classic porticos and then Gothic castles? What rime or reason is there in such revivals?

When a culture trait thus travels outward from its point of origin, or gains another lease of life, it never remains the same. It is more or less subtly changed to suit the needs of those who take it. Save for the simplest devices, like matches, every instance of diffusion is also a case of invention. There must be adaptation to an alien environment, incorporation with the similar traits of the new group, subtle blends to suit a somewhat different group temperament. Think how variously the principles of Gothic vaulting were applied in France, in England, in Italy and Germany! Think what the Italian artists made of the method of painting in oils! In China, gunpowder is used for toys and

for religious rites; see what the Europeans have done with it!

In the case of great ideas it can almost be said there is no absolute invention; all the genius lies in the subtle use of materials borrowed from elsewhere. The Moslem, Hebrew, and Christian intellectual life of the middle ages all started with the discovery of the Aristotelian writings; yet the Arabs achieved a poetic pantheism, the Jews a rationalization of the Law, and the Christians a skeptical and empirical science. The revolutions of the 18th century let loose the idea of liberty. To the French it meant the ballot, to the English legal redress, to the Americans, pioneer freedom from restriction, to the Germans, the free speculation of the mind. What does it tell us of a people to learn that they are professing Christians, or that they enjoy representative government? Generations have labored to give them the peculiar institutions they possess.

The process of cultural change is neither a simple borrowing, nor an automatic development. In every important case it turns out to be a complex mixture of stimulus, absorption, and gradual reconstruction. It never follows the course that might have been predicted. The sharpest breaks with the past, the most spectacular revolutions, are rarely those that effect the most fundamental changes. The French Revolution left France the least altered people in Western Europe; it created Germany. It was not the Convention, the Terror, or the military conquests that made a lasting impression; it was the adoption of equal inheritance in land. On the other hand, America, with no 19th century revolution, has grown far away from the Eu-

rope of the past. The really important changes attract little notice. They have occurred before they are marked. In human history there are no real discontinuities; there is only more or less gradual change.

Such slow adaptation is always going on, even in the most stable communities. It is accelerated by foreign contacts, or by the presence of a rich past that has not yet been assimilated. It is slowed down in extreme isolation, as among the African tribes; or when, as in China, a high degree of civilization has been widely diffused over a large and economically stable group. The process of invention is hastened in several ways. It occurs most rapidly of all when a group previously confined to its own resources suddenly establishes contacts with a richer civilization. The classic example is 19th century Japan, greatest of all instances of the fairly conscious assimilation of an alien pattern of life. There is no parallel to her intelligent adoption of those foreign institutions most needed to compete successfully in a radically different world. Usually the richer civilization is very slow to change its ways, even when they might be manifestly bettered. How little the West has yet learned from the Orient!

Next to cultural contact, it is changed environment that most stimulates invention. Occasionally climatic changes occur, forcing new ways of life. Within the last two thousand years there has been a slow drying up of the Near East. An agricultural civilization has given way to a desert culture. But usually it is the far more rapid environmental differences that follow migrations that lead to the drastic readaptation. The Greek herdsmen who became sailors and traders, and, drawing on all the resources of the Ægean world,

lifted the ancient Orient to its greatest achievements; the Eastern barbarians who invaded the Roman world and finally raised a reconstructed Hellenistic civilization in mediæval Europe; the immigrants into 19th century America who have built so differently from Europe,—these are familiar examples. Remarkable for its rapidity is the case of the African negroes transplanted to a more complex social life.

Man can not only find new environments; he can also build them. In the dim past hunters and herdsmen settled down to an agricultural existence. We do not know the details of the terrific readjustment that alteration made; nothing can have approached it in intensity till man built himself cities. It is doubtless true that our struggles to fit into this new artificial environment have placed a greater gulf between us and the days of Washington than lay between him and the farmers who labored for Cheops. Our present transitional pains are largely due to our difficulties with the habitation we have ourselves builded.

Even within the same surroundings, change slowly takes place. A society that has a rich supply of raw materials and is economically expanding, that has not begun to utilize to the full the techniques it already knows, is bound to become more and more complex. Like the Europe of the middle ages, it will draw on its inherited store of ideas and processes, and eagerly borrow more from its neighbors. In particular, when once the conquest of natural power has begun, there is no stopping its swift growth. Invention succeeds invention; each new discovery gives birth to a dozen more. The progress of technological skill in recent Western civilization has been analyzed; the results

show that the inventions were not entirely accidental. They followed definitely upon a felt need in the industrial process, so definitely that most of them were made independently in many places within a few years of each other. One investigator has even figured it has taken about a generation to make each invention practicable, and another two generations to perfect it into a fairly stable form. Even material invention is thus clearly a product of group activity functioning through individual genius; and this holds true for the highest reaches of the intellect. It is obvious that Isaac Newton could not have invented the calculus in the 13th, or even the 16th century, or had he been born in Bagdad. It is still more interesting to note that his contemporary Leibnitz invented it independently, and that there were a dozen mathematicians who had almost reached the same result. As technological skill piles up, invention becomes more and more a social product; even when it is not made in great research laboratories, it is dependent at every turn on adaptations from other machines, on patient perfecting in practice, on the common body of mechanical science. Watt constructed his steam engine alone; Edison works with hundreds of assistants. With our scientific journals and our scores of laboratories, the present-day investigator can hardly make a discovery that he does not read of in another's report. The day of the individual inventor or scientist has gone, for science and technology have become social enterprises. They are no longer the pursuit of the isolated few; they have become part and parcel of our group culture.

In science we have one of the great transforming ideas, an inexhaustible stimulus to change as its impli-

cations are worked out in various fields. Let such an idea get loose within a culture, and no institution can stay the same. So subtle and intricate are their ramifications that they remain never-ending sources of new invention. Christianity has been such an idea for us; after two thousand years it is provoking new revolutions to-day. The thought of Plato and Aristotle is another; it is still so fresh that we imagine we have just come to understand it in this generation. Liberty has reverberated down the 19th century, leaving not a human relation untouched. Nationalism is quickening the long stable Oriental cultures into vigorous life. Such ideas, starting with a handful of prophets, advance with growing momentum till they have filled the space that was waiting for them; then they slacken their spread until the soil they have seeded has borne fruit. Though dependent at the start upon a favorable environment, they soon create their own environment, and seem to have a vitality, an inner logic of their own. Once embedded in a cultural tradition, nothing short of the destruction of that people can dislodge them. Even then they are caught by other groups and continue their invincible progress. They are the living stuff of which civilizations are made.

The process of invention is stimulated in divers ways, but once a readjustment is started, it traverses much the same stages. Some new device is welcomed for the advantages it obviously brings, or a change in scene is made. A family from a small town, let us assume, moves to the city. They bring with them a settled way of life, which includes among other habits the traditional Sabbath of church-going and quiet reading. They have no thought of altering their accustomed

tenor of life. They become faithful members of a city church; the parents are too set in their habits to change. But imperceptibly the young people put on city ways. The corner newsstand is seductive; before they realize it the Sunday supplement has replaced serious reading. The daughter discovers that worth-while concerts are given Sunday afternoons. The son begins to visit the movies. Shut in all week, they crave the familiar out-of-doors. The car takes them away immediately after dinner; more and more often they find it inconvenient to get back in time for the evening service. They are still devoted to the Sabbath ideal they have been taught to reverence. They boast to their city friends of the values of a day of rest.

Finally the son joins a golf club. Sunday is his only day for play; the links are crowded in the afternoon. At this point the parents take alarm. What are our children coming to? Their denunciation leads the young people to take some thought. They remember the arguments their more sophisticated friends had used, and repeat them with embellishments. Did not the Master say, the Sabbath is made for man? Have not Catholics always made a joyous thing of Sunday, rather than a nightmare of repression? Is not a symphony concert more an act of religion than listening to that stupid old preacher? Is not God most truly worshiped in the temple He has himself builded?

Beneath these defiant protests there is much serious thought. What after all is there of good in this Protestant tradition? Is it really worth while to waste an afternon over the fillers for flaring ads, or to rush from one gas station to another? The daughter definitely decides to attend another church where she can

hear Bach beautifully rendered. The son feels that he must have out-door recreation; he becomes master of a troop of boy scouts. Both feel that they are more truly finding the highest than in the old village days. To the parents, however, it makes little difference; their children have fallen from the righteousness of their fathers.

Here we have in miniature the characteristic stages of cultural change. New habits grow up beside the old, called forth by a new set of conditions. Men still give lip-service to the old standards, not realizing that their lives are falling away. The conservatives take alarm, and denounce in the name of tradition. There is a vigorous defense of the new by those who realize they have broken with the past. Justification is found in some part of the tradition; its spirit is appealed to against the letter. The fresh experience made possible by the new way of living calls forth its own ideals. The majority, feeling the old values and appreciating the new, are ready to listen to the mediators who undertake a conscious and reflective analysis of the shaken customs, and endeavor to extract their kernel. This core they try to realize amid the new conditions. To the conservatives, these mediators are more dangerous than the radicals; they are stabbing from within. But gradually such fears and prejudices are forgotten as the former standards grow increasingly irrelevant to the life that most men are leading.

The process preserves the same main outlines in the complexer case of the coming of a great new idea or faith. The discovery of Aristotle's thought in the 12th century is a typical instance. At first scholars welcomed it eagerly as a fruitful store of knowledge. But it soon

became apparent that Aristotle meant a new spirit and a new interest. Conservatives grew fearful of the science let loose. They prohibited the teaching of all the new Aristotelian writings. This confirmed the enthusiasts in their new-found faith, and they proclaimed the Greek as the very sum of human wisdom. It proved impossible to keep him out of the universities; he was bootlegged everywhere. The leading scholars resolved to study him and incorporate his truth into the older learning. Albertus Magnus and Thomas Aquinas managed to correct the one-sidedness of the doctrines of the Aristotelian zealots, and to effect a new Christian synthesis far richer than the old; but they had to struggle against both the conservatives who would have none of Greek philosophy, and the radicals who saw in it the sole authority. The former eventually died off and were forgotten; the latter too have been forgotten, for they remained authoritarians to the end and brought forth no new ideas. It was from the compromisers that there flowed a rich spring of invention and fresh discovery; the bigoted defenders of both old and new alike proved sterile.

This tale has been often repeated in our past. A new force finds its adherents; those who had at first accepted prepare to defend the tradition; the most thoughtful essay the rôle of mediation. This demands a wealth of ingenuity and invention that leads to fresh insight and discovery. The mediators and modernists of yesterday become the builders of to-day. The first innovators are remembered as men of extraordinary if narrow vision; they stimulate, without constructing the forms that are eventually adopted. The conservatives are left to oblivion and obloquy. What finally

wins men to the more moderate of the progressives is not cogent proof or rational argument, but the richness of the life they stand for; the older faith is not conquered in battle, it is left behind as irrelevant to the new interests called forth by a changed scene.

In a sense these great creative builders of civilizations are not the most original thinkers. They are keenly sensitive to new currents. They welcome the fresh insights of more prophetic minds. They are responsive to all the forces they feel in the life of their times, the old as well as the new; and they systematize, order, and rationalize a transition that has already occurred. Of such are the Thomases and Erasmuses, the Luthers and the Lockes, the Goethes and the Hegels and the Spencers. They stand out as representative of their times; they are stimulating and inspiring just because in their thought so many ideas, new and old, are held in solution.

In the past the new standards and faiths have thus come after the actual course of men's lives and thought had already been transformed. Men have rarely sought out fresh insight until the times fairly cried aloud for prophets. In only one of our institutions, in fact, have we made any provision for the active search for new truth. Science has built up a spirit that does not rest content with what is achieved, but is constantly looking for more and better beliefs. Elsewhere we have been content to allow practice to revolutionize our lives before we have undertaken to criticise consciously and reflectively the standards and principles we profess. It is no wonder, therefore, that science seems to us a disturbing and disruptive factor. It is never content with the status quo. What a society might achieve

that could broaden this scientific spirit of research and investigation to include all its institutions, we can scarcely imagine. There are those who dream of great foundations devoted to searching out fresh insight for the conduct of life. But so far we study to perfect the gas engine and the airplane, while we leave such things as marriage to the expressers of current confusion.

Cultural traits vary greatly in their rate of change. Material inventions spread most rapidly; witness the auto's conquest of the world. Habits of life dependent upon them can also alter with amazing speed. The American countryside has been literally transformed in its whole economy in the last twenty years by the auto and the telephone. Less efficient techniques soon die out, though lore connected with them lingers on for a time. Customs that do not sensibly interfere with new inventions may preserve their vitality for generations; witness monasticism in the European world. But intense new interests may slowly push even venerated traditions into the background. The pioneer communities even before the industrial revolution grew far away from their mother lands. Traditional beliefs and lore are discarded even more slowly. Most societies have been very tenacious of their rationalized systems of ideas; the persistence of the Chinese and Hindu philosophies is the rule rather than the exception. We should not be surprised that science, for all its popularizers, has penetrated so slowly even among Western peoples. Hardest of all to change are the basic moral ideals that have been gradually incorporated in cultural traditions. Everything conduces to reverence for the prophets of old, and again and again men return to them, seeking the spirit and not the letter, when

confronted by unaccustomed difficulties. Whole communities remain permeated with devotion to traditional standards long after their insistent life has belied them in every practice. It is this moral core of the great religious traditions that helps to give permanence to a host of adventitious rites and ideas that have come to cluster around it.

Rationalizers are prone to feel that customs long preserved must have justified themselves by their utility. They won out in the struggle for existence because they were of advantage. The Hebrew dietary laws, such men tell us, sprang from an insight into Oriental hygiene. The founders of our Constitution foresaw the needs of twentieth century America. In truth, the struggle for existence in human societies is not so insistent. Anthropologists are amazed at the customs, not only innocuous, but positively harmful, that can persist for ages. Customs have an immense inertia of their own; once started, they are most difficult to dislodge. Only the strongest pressure, or some great shock like entry into an entirely new world, can slough them off. To the naïve, every age is an age of transition; all things are ever being made new. To the historian of human cultures, even the most profound revolutions alter only the tiniest part of the life of a people. Hosts of our customs remain to-day as vestiges of our earliest forefathers. Our simplest actions go back to a clouded antiquity. We stand before the records of the Egyptian tombs, and marvel at how like that life was to our own.

This great fact of cultural inertia should reassure the timorous. The accustomed furniture of our life will remain for our time; our utmost efforts can accomplish

little, for good or evil. The most destructive radicalism speaks in the name of centuries of tradition. Viewed in perspective, the most far-seeing prophets appear as spokesmen for their times. But neither does the immemorial antiquity of a custom vouch for its value; it merely shows that it has become ingrained. If some great shock can loosen the hold of a small part of the past upon us, it might well be welcomed. It may alter for the worse; but it at least gives opportunity, for those prepared to seize it, to introduce the better. So rarely is such a chance presented that we cannot afford to let it slip away.

The remainder of our analysis will be devoted to the large-scale cultural changes that have overtaken our own civilization. This world of ours has been distinguished from those of other peoples by the successive waves of readjustment it has had to face. There has not been a generation since the 13th century untroubled by the difficulties of assimilating new forces and novel conditions. There have always been the three major parties of conservatives, radicals, and mediators; frequently the alignment has been complicated by several issues at the same time. For the last five hundred years the chief innovating forces have been two. The great economic urge to business enterprise has swept over us, altering in progressive stages the conduct of our lives. The intellectual force of natural science has accompanied it, with even more drastic reconstruction for our beliefs. The relation between the two has been intimate. Science has been generated and sustained by the needs of economic production; at the same time the major revolutions in technology have been dependent on the knowledge already gained of

nature. Yet despite their close coöperation, both business enterprise and science have possessed a vitality of their own; there is in each an inner logic of development that eludes any attempt to make one wholly the product of the other. To be intelligible, the stories of both must be carried on side by side.

Both business enterprise and science have roots extending far into the past. It was commercial development that led mediæval society to create its synthesis. The scientific faith that flowered in the 17th century can be traced back to the 11th, and even beyond, to the achievements of the Greeks. Both had been germinating for centuries before their full revolutionary effect was obvious. We usually attribute the breaking up of mediæval social organization to the commercial revolution of the 15th and 16th centuries. At that time, though business men were still a tiny minority in an overwhelmingly agricultural population, their interests had grown strong enough to disrupt the mediæval institutions. The humanistic renaissance and the Protestant reformation, though many intricate streams united to color them, stand as the embodiment of this first cultural revolution. For the next two hundred years business was by leaps and bounds to triumph over all obstacles. It was as an ally of the new commercial spirit that natural science achieved popularity in the 17th century. A series of outstanding men of genius then formulated the scientific ideas that have dominated exact thinking to the present generation. We shall endeavor to indicate briefly the stages in the rapid growth of both these modern forces.

In the 18th century the first serious and conscious attempt was made by Western society to adjust its

older forms and beliefs to the new currents. The Age of Reason undertook to reconstruct every institution to satisfy the demands of business life. The intellectual leverage it employed to bring about its revolutions was the new science. From the great political constitutions and economic programs of the time we have inherited both the basic forms of our present-day social life, and the "scientific" rationalization that is still their justification. In practice, that adjustment was overwhelmingly successful; but in theory it proved somewhat premature. The 19th century was ushered in by a wave of reaction; in the Romantic movement the older tradition made its last stand. But though in the main a conservative protest, Romanticism bore ultimate fruit in a succession of great mediators and modernists. It is their compromise that moulded the thought of the 19th century, and it is by these century-old ideas that our contemporary mediators are still trying to live.

Meanwhile business had called to life machine industry, and science had steadily spread its intellectual control over our beliefs. The coming of the machine and the triumph of the laboratory at length so altered the scene in which we of to-day move, that we now face a far more thorough readjustment. We realize that neither of the two former attempts at mediation, the radical compromise of the Age of Reason, and the conservative compromise of the Romanticists, was drastic enough to meet our present needs. The cultural changes of the modern period seem now but preludes to those we must undertake.

The earlier triumph of business enterprise, the discovery of the order of nature; the premature attempts

at adjustment, the 18th century revolutions and the temporary Romantic reaction; the coming of the machine and the irresistible advance of science,—these movements form the background against which we must understand our own insistent problems. It is our purpose to survey them briefly before entering on a closer analysis of our changing civilization to-day. But before attempting so complex an investigation, it will be well, by taking one of our institutions in which transition has been most obvious, to illustrate in fuller detail the process of cultural change.

The Christian family was the core of the old rural society. It was the basic social unit; around it had grown up a multitude of varying functions. Among these, the regulation of the sexual life was hardly primary; for there existed many recognized outlets for the sexual urge. The family was rather the organization for the production and education of children. For the great majority, there was no need of formal schooling. Adaptation to the world into which he had come was won by the child through sharing in the family's labors. The son soon began to help his father; the daughter took her place in the household at her mother's side. Parents and children together formed an economic unit, for both production and consumption. Nearly every article of use was prepared in the home. A wife was an economic necessity, as she still is on the farm. Even the hours of recreation were spent largely in the family circle.

In its larger relations the family acted as a legal unit, represented by the father as its head. He held all property, and transmitted it usually to his eldest son. Upon him fell all legal dues and obligations; it was

he who personally entered into the ramifications of the feudal or manorial system. Clustered about him was a household of dependents, aged parents, unmarried sisters, orphaned nephews and nieces.

Over this mixture of child-bearing and economic functions was thrown the cloak of religious sanction. Marriage was an indissoluble sacrament, uniting man and wife forever, and creating an enduring framework within which the moral virtues were to be developed. From ancient times the patriarchal household had been the unit of religious worship; and though the Church had removed the priestly functions from its head, much of the old spirit still remained, to flower again in the family devotions of Protestantism.

Of love, in the modern sense of romantic attachment, there seems originally to have been little. Marriage was arranged by parents on the basis of more enduring considerations, property, domestic accomplishments, and the like. For a lifelong coöperation involving so many activities, mere children had not sufficient wisdom to choose a partner. As among the Latin races still, sexual passion had little to do with the family. If it could develop for a time, so much the better; but compatibility and solid affection were much to be preferred. Many genuine comradeships must have occurred, especially among the lower classes; but the training of women made difficult a love involving intellectual sympathies. Such romantic love appeared first in the closing Middle Ages, a symptom of the emerging cult of personality; but it was bad form to direct it toward one's wife. Gifted women had their part in the Renaissance. They walk across the stage in Shakespeare's plays, and then disappear. As a liter-

ary cult and a social ideal, romantic love first comes into its own with the individualistic 18th century.

Such households are still to be found in France or Italy; they give one a sense of the vitality and power of the old family life. Children are cherished with a tender affection and solicitude that gains, perhaps, from the lack of warmth between the parents. Husband and wife have come to feel the friendly need of each other bred of years of divided labor for a common end. However restricted her legal rights, the mother feels no oppression, for she is supreme in the household. The father still enjoys the respect due the head of the family. There may be little of the careless democracy of the American household; but there is the ever-present sense of a binding institution to which all are devoted, and a mutual respect for each member's labors in his respective sphere. It is not mere passion, or mere convenience, that holds such families together. It is loyalty to a common good, to a something intangible but powerful that is being built of human lives. The Church's sacrament is but the outward symbol of the inner sacrament of the family bond.

For the past two hundred years nearly every new force has conspired to weaken these ancient ties. Each wave of individualism has tended to magnify the members at the expense of the whole. The egalitarian faiths of the Age of Reason took no account of the family; such a functionally integrated group was the very image of the world they aimed to destroy. It was man the individual who was the vehicle of rights. Political and legal reform dealt with atomic units; the new education aimed, not to train the child to take his

place in the family circle, but to develop the rounded personality. Women too awoke as persons; they strove for liberty, for emancipation, for an identical status with the male. As these ideas came to rule the 19th century, what had once seemed a natural coöperation was felt as genuine tyranny.

What the apostles of revolutionary freedom preached as a natural right, the Romanticists idealized as a holy duty. Marriage should rest, not on the ignoble basis of dowry and property, but on the emotions and feelings, on love. It should enhance the freedom of two personalities; it should enlarge, not place restrictions. It was to be entered upon for the sake of what it brought to the participants, not for what they might give. Where that inner harmony of soul was lacking, nothing remained to prevent the agents from seeking it elsewhere. Children played little part in this new romantic ideal of love; the novels ended with marriage. Their lot was to rebel against their parents and go forth to seek their own spiritual salvation.

These 19th century ideas were the rationalization of the earlier commercial loosening of all social ties. So long as for the great mass the family remained the unit of production, they could hardly shake its fabric. Their full effect was felt only when industry had provided a new economic unit. Production forsook the household for the factory. Children and wives began to serve the machine and buy rather than make their goods. The new opportunities for women in the complex labor of the cities brought an independence to millions that ideas of liberty had not been able to effect. One by one large-scale production stripped the home of its former functions. The time-honored duties

of the housewife, the preparation of food and the making of garments, were more efficiently performed elsewhere. It was futile to sew one's dresses and make jellies. Money was needed for other newer necessities, phonographs, radios, autos, the movies, and the host of novel wants stimulated by advertising. More and more interests took the family's members out of their home. Labor, recreation, were both found elsewhere. The city flat played a major part. The circle of dependents dropped away.

Child-bearing under urban conditions proved burdensome. Both economic necessity and the lure of pleasure sent the birth-rate down. Methods of preventing offspring spread widely among all but the most ignorant. What children appeared were bustled off to school. Marriage found itself depending more and more on sexual passion and romantic love. Little else of its former functions remained; love was left the only unifying ideal.

Such modern conditions were a fertile ground for the newer "scientific" ideas about sex. They gained popularity just when the tie between man and woman had become most narrowly sexual, when the richness of material wealth had built up the habit of self-gratification, when the older outlets for creative energy had been constricted by a crude routinization of life. Sex was all-powerful, sex was beneficent; repression and narrow direction issued in an unsuspected crop of ills. Beware of rigid control; satisfy the deepest demands of nature. What if homes were broken up? More important was satisfactory sexual adjustment. Thus ran the new scientific gospel; it fell on receptive ears. If love was indeed the sole basis of marriage, and love

was sex and nothing more, what need of the traditional taboos? The lifelong promise to love and cherish was as antiquated as that to obey. The new psychology also raised the bugbear of the fearful complexes that sprang from too affectionate ties between parents and children. Here let us repress, here practice asceticism; mother, forbear that kiss! Bestow all your love on your present husband, that your son may himself love to the full. Here was "scientific" justification for the gulf between parents and children which our hectic changes were placing between the generations.

Moreover, does not science counsel us to experiment? In this age of faith in empirical verification, who would accept beliefs, however sanctified by tradition, that could not justify themselves in our own experience? If sex is so all-important, let us explore it amid varying conditions. What is more in the spirit of the laboratory than trial marriage? or than to reject a marriage partner who does not pass the tests, and hopefully try another?

All these forces, economic and intellectual, have been beating against the family for a generation. Though for most of us the older ideal is still attractive, we have widely departed from it in our lives. The home is no longer a center of production, and we do not care to make it one again. It has largely ceased to be a unit of consumption. Though meals are still prepared there, we do not know how long the inefficient domestic kitchen can survive. The simple pleasures of the earlier family circle find little place in four-room flats. More and more the home is the scene of a few hours' snatched sleeping, and little else. The radio holds forth there; the car is still a family

matter. But most of our other diversions take us away from our gas-lit hearth. The legal independence of the wife is almost achieved; the newer codes go far to emancipate the children from parental control. Property has long been an individual matter. Education has been relegated to the school, and what can not be there achieved is oftener than not omitted entirely. Our modern theories would take the year-old child to the nursery school, there to receive skilled and scientifically informed training; at great expense they would attempt to reproduce artificially the environment of the old household where children learned by doing. Children are fewer, and there are many childless marriages. They are such a problem in case of divorce! Romantic love is the sole respectable basis for marriage; it is immoral to hold a partner where such love has fled. Divorce is accepted, and frequent; marriage is a free contract to be broken at will. For multitudes, the religious sacrament has ceased to have meaning when no other sanction than passion is left. Extramarital relations are entered into freely, as ever, but now with no sense of guilt or sin.

Now that we do these things, radical theories have come to justify and push us still further. They are receiving a serious and respectful hearing from the most intelligent. Love, we are told, is a purely personal matter between two free individuals. Unless children issue, society has no right to step in. Love should be wholly free to seek the fuller union and the wider experience; it must submit to the trammels of no responsibility. Society will take care of the children. Motherhood will be pensioned; offspring will be placed at once under wise guidance in model institutions.

Everything will be made easy for an unbridled sexual life.

In the face of sweeping changes and extravagant theories, the conservatives have taken their accustomed alarm. The family must be preserved. The marriage sacrament must be respected; divorce is an evil that must be stopped. Let us pass new laws and enforce old ones: there must be no remarriage of the divorced, there must be no breath of birth-control. Some have even courageously advocated a return to the old Latin tradition. Let these young people find love where they will, as their forefathers did; but let the family be based on something stronger than a passing attachment. For the sake of the children and their upbringing, for the sake of a settled society, for the sake of much needed moral training, for the sake of that spiritual development that comes from a certain tension between man and wife, let the family, once established, be permanent and indissoluble. We have been ruined by expecting a stable union to be built on the sand of passion. Our hope is a return to the system that worked for centuries; let passion and marriage be kept apart.

These are the materials with which our generation must work. Here is an environment changed in countless ways, in which disturbing theories have found ready acceptance. Here is a group of radical critics of marriage and the family, with ideas that obviously disregard most of the values we have found good in the past. Here is a set of conservative and reactionary defenders of tradition, who make no attempt to face the complex causes that have revolutionized our practice. The typical factors involved in every major cul-

tural transition are present. And already the third group, the mediators, are coming to the fore. They recognize the inevitable changes, the sloughing off of many of the accidental functions that formerly clustered about the family unit. Above all, its old economic status has gone beyond recall. They welcome the new insistence upon love as essential to the marriage relation, the equal rights of both partners to the utmost they can achieve of sexual harmony, both physical and spiritual. To them it is inconceivable to return to the *mariage de convenance*. They are willing to make allowances for the inevitable failures and maladjustments; the old code that harshly offered no relief has gone. But they would make such mistakes less frequent by cultivating a higher sense of the seriousness and the responsibilities of the marriage tie. As they scrutinize the old Christian home, they feel that its devotion to childhood is too precious to lose. For them it is still true that marriage entails obligations to children that must not be subordinated to the selfish passion of man and wife. They brush aside as unsubstantial theory the claims advanced for the institutional substitute for the home. They point to statistics that tell overwhelmingly against it even in physical well-being. They appeal to the unanswerable advantages in subtler, spiritual things, which those who have once enjoyed a real home are not prepared to sacrifice even for liberty. And while they place little reliance on the external sacrament of a church, they hold forth the deeper sacrament of common living in devotion to a high ideal. To love and work for the children, to sacrifice for them, to extend a wise and helping hand; to seek the inevitable adjustment that must preside at

every mortal union, however intimate; to crown passion with enduring comradeship and affection, and both with the spiritual fruits of serious parenthood, —this, they feel, is the permanent core of the Christian home, and this is a truly religious ideal.

Indeed, side by side with our cult of freedom and self-gratifying irresponsibility there has grown up a new cult of the child. The old inessential crust having once been loosened by rebellion, men are returning, even in theory, ever more fluctuating than practice, to the underlying values of marriage. It is common to see the most outspoken radicals establish families in which the children are sacred—often too sacred for their own good, for as yet men are but feeling their way. Concern for their children's welfare, and the perplexing problems of their education, is often the pathway from careless indifference to a genuine interest in social obligations and affairs. These modern homes may differ from the sentimental idealization of our childhood. There are no wide lawns and spreading elm-trees, no smell of canning and preserving, no cookie-jar. But there is far more serious thought about the children, far more enlightened and intelligent parenthood, far more genuine affection and understanding, than prevailed before. Such homes are not the rule; they never were. But they stand as symbols of what can be created even with our changed conditions; and while they stand, we need not fear greatly for the future. How to combine such a serious attitude toward the rights of childhood with the insistent claim of man and wife for love and comradeship, is no easy problem. Present demands are greater; our insight has deepened. But no thoughtful observer will judge our ideal less high.

VI

THE COMING OF BUSINESS AND SCIENCE TO THE OLD SOCIETY

Western European society at the close of the 13th century was in unstable equilibrium. The nice balance between the older forms of the early Middle Ages and the new forces that had appeared in the 12th century was being upset. For a time the mediators had been successful. They had been able to incorporate the newer currents into the old institutions, and to organize a complex society whose rich interests were held in focus on a unified goal. But the manorial system was proving inadequate for an agriculture rich enough to employ better techniques and to insist on more division of labor. The loose ties of feudalism, sufficient bonds for peasant villages, and for the early market-towns, were not enough for rich commercial cities. A tenuous loyalty to a distant Emperor, though it served the ideal union of Christendom, faded before the more realistic drive for strong national governments. Within the towns, the earlier coöperative spirit had assimilated trade to the obligations and duties of feudal society and had idealized those necessary combinations as the religious service of the needs of mankind. But now merchants were strong enough to relax those bonds and forget that service. The wealth that had once built a mantle of churches began to flow into

mercenary troops and fleets, staunch vessels, mines and commercial wars. The church's power, for a brief interval employed to organize European society, became rather a weapon in the rivalries of states and classes.

Nor could the new Greek wisdom that Thomas had so successfully blended with Christian piety and adoration remain long in that unstable solution. The spirit of Aristotle and Plato drove scholars on to trust in observation and in mathematics. A century after Thomas the University of Paris had become the stronghold of an empirical skepticism that ventured to question the rationality of the old faith, and of a burning interest in the mathematical interpretation of nature. The truths of God and the truths of human knowledge were drifting apart.

Neither could the union of mystic Christian aspiration and human wisdom that fills Dante's pages remain undissolved. The new richness of city experience combined with the growing study of the Greeks and Romans to push the world-to-come farther into the shadows. The Christian epic ceased to be a symbol of human doom and became the field wherein painter and sculptor sought to vindicate the dignity and worth of man.

The potent forces in this gradual transformation were the streams of trade that altered men's lives, and the ancient thought in which they sought justification. The triumph of business enterprise brought the dissolution of all those forms of social organization that had earlier risen to control it. Men broke from the manor, the guild, the feudal order, the Church universal. The one organizing force they now recognized

was the centralized national state. For a time they were too busy emancipating themselves from outgrown institutions to seek new intellectual horizons. Social struggle and the vindication of secular interests, in terms of ideas so admirably expressed by the ancients, absorbed nearly all the spiritual energy. But with the establishment of strong states through which business could function, with the definite subordination of religion, there was felt the need of a system of beliefs to replace the churchly theologies and to rationalize the new order. Having destroyed the religious and coöperative structure of society, business interests welcomed the new harmony of natural law. What faith had been to the 13th century, the expression of ultimate social and intellectual interests, the reason of the new science became to the 18th. The scientific spirit sought to complete the transformation that business enterprise had already largely accomplished.

It is significant that towns arose in mediæval Europe primarily to meet the needs of trade. It was the merchant, not the craftsman, who came first. From the very beginning of European urban life, buying and selling took precedence over making. Handicrafts grew up to supply the demands of the market. We hear of the rich and powerful merchant, not of the wealthy master craftsman. Merchant guilds, combinations of traders for mutual protection and advantage, were in control of the towns before the craft guilds rose to power. When manufacturing had grown to importance, and Europe had been divided into those lands, like England and Spain, that produced raw materials, and those, like Flanders and Northern Italy, that made them into finished products, it was the trad-

ing centers that retained the power. The coming of money, the discovery of silver mines, first in Germany and then in the new world, gave the merchant an additional advantage. With his profits he became a banker, and by holding the strings of credit established control over the producer. The legend goes that the first bank was formed in commercial Genoa; certainly the trading towns, in Italy, South Germany, and Flanders, became the seats of financial control. Merchant bankers either held the reins of government themselves, as in Venice, or set up some able lieutenant, some strong man on horseback, to attend to their affairs. The Florentine bankers, the Medici, established their own dynasty; other adventurers, like the Sforzi and the Este, prospered as they served their merchant masters. Even the Popes carried out their plans through the skillful administration of the revenues of the Church.

Renaissance Europe was a commercial, not a manufacturing society, set in the midst of rural lands. Merchants and bankers attained large-scale organization of their interests while production was still on a simpler basis. The expansion of industry, in fact, came from the merchants and not the craftsmen. They demanded more goods to sell; they sought a more profitable field for investment. In the 15th century great banking families, the Peruzzi, the Medici, the Fuggers, had already established a full-fledged capitalistic system. They owned mines and herds and lands, ships and caravans and banks; and they were rapidly building up a rival system of production to compete with the older craft guilds.

The domestic system, thus established by capitalists,

marks the triumph of business enterprise over mediæval craftsmanship. Those with ample funds would furnish raw materials and tools, spinning wheels and looms, to a large number of workmen, receiving back for sale the finished goods. They went outside the towns where guild restrictions were irksome, and built up new communities of small householders. It was essentially the same process we have since observed in our rapid expansion of large-scale production. It was the triumph of the non-union plant. At one stroke the new investors escaped the whole carefully built up regulation of mediæval craftsmanship. The banker, the investor, and the merchant were to be supreme in the new economic order.

The effects of this dominance by commerce have been of incalculable importance. For five hundred years the commercial spirit has ruled our lives, determining our customs and our motives, our goals and ultimate values. It was commerce, and not production, that built up the new political institutions. It was commerce that introduced capitalistic methods into both manufacturing and agriculture. It was the commercial middle-class that engineered the legal and constitutional revolutions of the 18th century, under whose forms we still live. It was commerce that presided at the introduction of the machine, and bent it to the service of profit and gain. Our economic organization has of necessity adapted itself more or less adequately to the needs of machine production; but the underlying structure it still retains arose in a commercial, not a machine age, and was designed to serve the interests of merchants and investors first of all. Capitalism is the offspring of trade and business. Though it has

reached its present power in a system of machine production dominated by business enterprise, it is not itself the inevitable fruit of the machine. Rather our present mass production, the use our society has made of the machine, has been at every stage determined by an already existent capitalism. Thus our economic life has been moulded by what we truly know as the Commercial Revolution.

The successful trading centers of the late Middle Ages, in Italy, Germany, and Flanders, managed to find a political organization adequate to their needs. The Italian commercial states, ruling over wide empires in the Levant, had early developed constitutions that subordinated landed interests to the demands of business. The German and Flemish states also, either by adhering to the Imperial power or by strong federations like the Hanseatic League, secured the support necessary for their commercial enterprise. But the great raw material producing areas, Spain and England with their economies based on wool, France the rich agricultural land, remained loosely organized feudal states. When trade had gained a sufficient foothold here to seek for more, it found itself hampered at every turn by the levies of landlord nobles. Merchants needed strong support to enter on serious rivalry with the powerful fleets of Italy and Flanders. In divers ways these raw material states prepared to gain a place in the commercial sun. The expeditions they sent forth to East and West succeeded beyond their dreams in turning the streams of commerce to their ports. The centralized governments they set up consolidated and extended their new advantages.

Amid the increasing rivalry of the Italian states, the older communal governments proved inefficient. Everywhere but Venice strong-handed despotisms took their place. In the pages of Machiavelli we can read how sensitive such princes had to be to the call of the merchant. An even greater concentration of power was needed if Western Europe was to win the palm. In Spain, France, and England, the royal government, already strengthened by centuries of destructive feudal squabbles, gained further power as the townsmen turned to it for help. An offensive and defensive alliance was struck between king and merchant. The king received the money wherewith to support a standing army, to enforce order on the king's highway, and hold the nobles to the king's peace; the merchants gained privileges and protection, and the effective help of royal fleets. Under the Tudors England achieved commercial importance; under the Bourbons France began to assume its present aspect as a nation of peasants governed by bankers and merchants.

These strong new states were absolute monarchies in all but name. Within, they enforced the law and order so precious to the merchant; gone was the substance of the old feudal rights and obligations. Without, they were sovereign powers; each was an "empire," knowing no duties to equals or superiors in the fierce commercial rivalry that had set in. Under strong monarchs furnishing protection and privileges, commercial prosperity flourished. With a royal symbol and with the unifying hatred of commercial rivals, the long growing national feeling flowered in a golden age. Poets, dramatists, painters and architects arose in re-

sponse to the quickened current of national life. There was a new world across the seas to conquer; there were even greater riches to be won at home.

Because these new nations had arisen from the need for power and protection, merchants were not yet ready to welcome free competition. The same demand for coöperation that had created the earlier guild system now transferred that regulation of trade and industry to the national state. It was the first age of economic nationalism or mercantilism; the second came with the need of winning markets for the machine. Frenchmen, Spaniards, Englishmen must hold together against the common foe. The old checks on competition, tariffs, monopolies, bounties, enforcement of standard quality, were all preserved. But the end had ceased to be Christian; it was the new religion of national prosperity for the middle class. Above all, it was devoted now to expansion. Win new empires beyond the sea; outstrip the rival; bend those conquests to the gain of domestic merchants. Pile up a surplus in the royal coffers, for gold is the sinews of war, and from war comes more gold.

The new emphasis in the mercantilistic economic system is upon the novel problems of managing colonies. Most of the other regulations were taken over with little change from the earlier guild age. It was the extension of the paths of commerce to the New World and the Orient that struck men's imagination. The prosperity of the Western nations was visibly bound up with the new trade routes. The national rivalries that so stirred popular feeling were for the control of the Indies. In the fleets and expeditions the merchants had a golden field for investment; the gain

was hazardous but enormous. It was easy to persuade the royal monarchs that here was a fitting national enterprise; it was easy to capitalize the thirst of stout yeomen and burghers for the glory of the national arms. It was not long till men forgot that peace had ever been the aim of governments. It seemed so natural that competitive commercial expansion should be the chief function of the state.

It is needless to chronicle the rapid development of business organization under the impetus of gold from the Indies. The modern corporation had its birth in the joint-stock companies formed to control the swelling trade. Banking too sought combination; great national institutions for the control of credit came into being. Insurance sprang up to distribute the new risks. All these things would have come in any event with expanding business; but they were greatly hastened by the opportunities of the New World. It was in 17th century England that these developments occurred. There grew up the characteristic forms of business enterprise that a century later presided at the introduction of the machine.

More subtle was the influence of the new discoveries in throwing a glamour about the life of the merchant. Those early voyages called for courage and devotion of a high order. About them there was nothing of the spirit of the shop or the counting-room. To pursue business enterprise amid the dangers of the Indian Ocean or in the jungles of America partook of high romance. The old idealism that had invested squabbling barons with the mantle of chivalry, and had consecrated the Crusades, now easily attached itself to the search for gold. Pirates and slave-traders

and buccaneers who robbed on the Spanish Main replaced the old fighting knights as popular heroes. Traders and pioneers among the Indians brought new prestige to the middle class. Those of the old nobility not content to lose their functions found ample inspiration in enlisting in the new commercial raids. All this hastened the decline of feudal standards, and assisted the spread of the new business spirit. The early lure of the Indies, the tales of reckless daring, the hardships of pioneer settlers, idealized the expansion of trade as centuries of steady growth could never have done. It was not hard for business enterprise in this guise to become a new religion. The worship of God gave way insensibly to the worship of gold.

In a society tottering under the disruptive impact of these expansive forces, the old unity of Christendom, enforced in the organization of the Church, could no longer be preserved. All the religious movements that since the 13th century had sought to modify and revitalize the mediæval Church now came to a head in an open break. The Protestant revolt was not, indeed, primarily a religious, moral, or intellectual movement. Its immediate fruit was for the masses a distinctly lower level in all these respects. It was rather an outburst of anti-clericalism,—a protest against the Church's political, social, and economic control of life. The underlying reasons why northern Europe broke in the early 16th century from the great organization centering at Rome are not to be found in the religious and moral fervor of the great Reformers, the Zwinglis and Luthers and their immediate followers. For generations earnest moral prophets had sought to purify the practices of a church that had fully embraced

the world to conquer it. Mystics had sought to break through the priestly hierarchy to an individual communion with God. Humanists had tried to recall men to the simple philosophy of Christ, or to the gospel of Paul. But though these movements had produced a growing discontent with the old religious order, and though they were all called upon to furnish justification for the break when it finally came, of themselves they were too weak to attain wide popular success. What sent men flocking to the banners of Zwingli and Luther was the deep desire to escape from the social organization of the mediæval world. The economic currents of the 15th century had overflowed the narrow channels that had sufficed a less commercial society. A sturdy capitalism could no longer brook the trammels of the canon law; the bishops' lands and revenues, the wealth of the monasteries, were too seductive; the political pretensions of the Roman curia were swept aside by the tides of national sovereignty.

In many ways, indeed, the Church against which the Protestants revolted had assimilated far more of the spirit of the new age than had the Reformers. The genius of Italian humanism had captured the Roman curia. The old ascetic ethic of the monk had peacefully given way to the Hellenized ideals of Leonardo and Michelangelo; the literal belief in the Christian epic had been dissolved in the symbolism of the Platonic philosophy. In the hands of the Northern humanists, like Erasmus, the Christian tradition seemed about to achieve a new synthesis that would incorporate the moral and intellectual inspiration of the Renaissance as successfully as Thomas had assimilated the wisdom of Aristotle. About these things the Protestant

reformers cared less than nothing. Intellectually, indeed, the Reformation was a fundamentalist reaction against the modernizing Papacy, against the humanistic scholars and the artistic ideal of life. The Renaissance popes were too radical, too ready to absorb the currents of the day. The Reformers laid new emphasis on the older mediæval world-view. They clung to the whole Christian drama, the corruption of man's nature, the wrath of God, the dire need of salvation, and the magical process of redemption. What they rejected in the Church's beliefs was largely those elements of science and humanism introduced by Thomas. Even the 13th century was too modernistic for them.

Yet despite this reaffirmation of mediæval beliefs, the Reformation belonged to the new commercial age. Though mediæval in its world-view, it was modern in its values, in its judgments of life. Above all, it stood for individualism; and it broke the power of the mediæval organization as humanism had not done. It offered men a valid moral ideal for this world; and it gave it a religious sanction, as humanism had not. It completely destroyed otherworldly asceticism, and all ecclesiastical authority founded on the sacraments. It succeeded where humanism failed, because it concentrated on what concerned men most, the escape from the social control of life. It was quite willing to compromise in the less important intellectual realm. The old beliefs could remain, so long as men's actions were freed from control. And much as the Reformers hated freedom of thought, that too came soon enough, when once the freedom of individual action had been achieved.

Where the humanists had denied man's corruption and his need of magical redemption, the Reformers concentrated upon salvation as central. They thus preserved an essential continuity with the older Christian scheme, and won all those not prepared for so great a break. But where the humanists were content to recognize the Church as a wise organization for the administration of human society, the Reformers insisted that salvation was a private, personal matter. Their very emphasis on salvation, to the exclusion of the other religious functions that had grown up in the mediæval Church, made the religious life essentially an individualistic, not a group or social concern. The priesthood of all believers; justification or salvation by faith, as an affair between the individual and his God, and not by works socially administered; the free grace that came not through external and ecclesiastical forms,—this was the core of the new theologies of Luther and Calvin. Here was religious justification for dropping the whole sacramental system, and with it the whole churchly control of man's social life. No wonder that men and nations, interested deeply in shaking off that control, and not at all in changing their familiar religious beliefs, flocked to the banners of the new prophets.

The result of the elaborate logical structures raised by the reformed theologians was to make salvation a purely personal and religious problem. Being saved does not depend on conduct, it precedes conduct. It comes as a free gift from God; its coming has been predestined for uncounted ages in his divine counsels. Salvation, in other words, is a non-moral matter; and

conversely, moral values are divorced from one's religious hopes and views. Ethics has become human and independent.

At its best, in those for whom faith was still a burning reality, such release from external sacraments and obligations flowered in a worthy liberty. It made for a disinterested moral life, freed from the fear of hell or the hope of heaven. The Christian was already saved; he was free to follow the God he knew and loved, for God's sake, not for his own gain. Luther's early *Liberty of the Christian Man* is a noble expression of this selfless moral ideal. There is a sublimity in Calvin's stern behest to find the law of God and follow it for his glory; salvation has already been determined for the elect. But most men were not reckoned among the saints. For them, to divorce religion from conduct meant to divorce it from their lives, to relegate it to an inner chamber of private observance. Religion had once colored their whole existence, as the natural flowering of their every act. Now it was an affair too sacred to intrude on others, a matter for Sunday worship or family prayers. And the weekday was left free for men's ordinary pursuits, soon engulfed in the rising tides of profit-seeking and business enterprise.

Old habits were still strong; the ingrained custom of religious and moral control could not at once be abandoned in obedience to newly thought-out theologies. The Calvinists in particular made for a century a valiant attempt to carry over the older religious organization of society. Where the elect were really in power, in Geneva, under the Commonwealth, in New England, there was perhaps a narrower attempt to direct men's lives than had prevailed in the dissolving

mediæval world. But business triumphed in the end, for the reformed churches could make no valid pretension to oppose it. They had already abandoned the claim; it was merely a matter of time before the substance followed. The Christian moral and religious standards were pushed out of business, out of social intercourse, and retreated to the private life of the individual. Thus was consummated that gulf between our high and consecrated ideals and our daily practice that has marked modern life ever since.

The Church universal was gone. It mattered little whether a country were Catholic or Protestant; its religion was bent to the service of commercial expansion. Most Catholic Spain was as bitterly nationalistic as true blue Protestant England. The Spaniard could now feel he was serving the Virgin when he repelled the English robbers; the English pirate trader could feel a religious duty to relieve the Castilian of his gold. One religion was too narrow to hold two such determined rivals. The map of Europe took form in accord with national feelings. The rich commercial regions of the older economy, Italy, South Germany, Flanders, remained Catholic; the upstarts like Prussia, Holland, and England added religious consecration to their rivalry. The Habsburg realms found Catholicism a welcome weapon against heretical rebels. France, not yet a serious commercial claimant, had in 1516 obtained nationalistic political prerogatives for the Gallican Church that made unnecessary an open break. Everywhere national churches were set up, Protestant or Catholic. The old unity of Christendom was gone even in name. The canon law, that had preserved the ideal at least of peaceful coöperation, gave way to

salus populi and reasons of state. The rudimentary international law that emerged to take its place was a kind of code of honor among thieves, an insistence on the bare essentials of commercial intercourse. In practice, it amounted to what the strongest nation could impose. Between states as within them, the ideal of unity had vanished. It was now every man for himself. The freedom to contribute to the life of the group, to find satisfaction, like the builders of the cathedrals, in working together for a common enterprise, had given way to self-seeking, self-cultivation, making money, living wholly unto oneself. Men's lives were spent amidst class-striving, bitter struggles for land and power and influence, national rivalries, wars and rumors of war.

As commerce grew and the new religion of this world's goods took root in Protestant lands, the moral and religious revival, proclaimed by the Reformers but hardly hearkened to by their rebellious followers, gradually came to pass. Two generations after Luther, Puritanism emerged to formulate the new moral standards and to give them religious consecration. It flourished among the commercial classes, the townsmen, the merchants and craftsmen, the independent farmers freed from the old manorial habits. It rejected mediæval asceticism and otherworldliness as of little earthly use. Celibacy and fasting were foolish, the monk's silent contemplation selfish and lazy. God had set man on this rich earth to make the most of his talents, not to squander them in unproductive prayer. That first burst of freedom from mediæval constriction, the joyous and careless abandon of the Renaissance, the artistry of life that lured the humanists, it

likewise put behind it as too frivolous. Man should seek a rationally ordered life devoted to some serious end; and what more serious than laboring diligently to make money in one's calling? He was responsible to God for the wise employment of his time; and what wiser than reaping the fruits of prosperity? The self-discipline of work and abstemious saving was the very mark of that godliness and holiness to which the elect were predestined. Responsible labor, thrift, no useless pleasure and enjoyment,—here were the virtues on which a capitalistic and acquisitive society is builded. Honesty, contract-keeping, resolute independence, shrewdness, dependability, the single-minded pursuit of success,—here were the natural ideals of the commercial age. No wonder it seemed, to men just bidden to go forth to live a God-fearing life as they saw fit, that their stern God had commanded them as duties. Nay, if they failed to seize an opportunity to make money, they were proving derelict to a divinely imposed trust.

These new business ideals sprang as truly from the soil of the commercial 17th century as the mediæval ideals of coöperation and mutual obligation and loyalty from the necessities of that earlier age. Now came religion once more to sanction them and raise them to a worthy end. The God-fearing merchant, honest, reliable, intelligent, just, and successful, is in his setting an admirable figure. He has served as the model men have actually followed down to the present day. On his virtues our society has waxed prosperous; by common consent we have not required him to possess so incongruous a quality as Christian love. All our institutions are made for him to administer. The small

business man still worships him. We are loath to admit that in this age of big business and mass production he has grown as obsolete as the monk. Self-discipline, honesty, thrift, sturdy independence,—we still expect them to open the pathway to success. But, alas, our captains of industry could tell a different tale.

One further step in the triumph of the business spirit it remains to point out. Business captured craftsmanship, and controlled it through capitalism. Agriculture too was bent beneath its sway. The countryside remained more resistant than the city; to this day more of the Middle Ages lingers on outside the towns. But even where farmers remain numerically strong, the farm has been steadily decreasing in influence. For a time the colonial expansion created whole societies of farmers; but even they were soaked in the spirit of the commercial age. Eighteenth century America was Puritan; the adventurous pioneers had lost all touch with mediæval collectivism and group life. They pushed their way across the continent in steady pursuit of private gain. The very freedom from social responsibility so longed for by the European merchant was ready at hand in the American wilderness. To such pioneers, the programs under which townsmen fought in the great revolutions were the substance of their lives. Hence the political and economic ideals of the Age of Reason have been more firmly rooted in our soil than in the lands that gave them birth. America has carried over into the machine age far more of the spirit of 18th century business enterprise than her industrial rivals, England and Germany. In the political and economic institutions, the Puritan moral standards, the narrow and intense religious life of the first great

age of commercial expansion, the pioneer, the independent farmer, and the hustling business man have been alike at home.

The capture of agriculture by the business spirit was the work of slow centuries. It began in the closing Middle Ages when the manorial system was breaking down. With the coming of money, feudal dues were commuted to rent. Large estates were collected by wealthy investors, often to produce some one raw material, like wool. In this capitalistic enterprise hired laborers replaced serfs. In many places the independent farmer or yeoman gained property rights in his land. Such peasant proprietors have remained the staunchest advocates of individualism, private ownership, laisser-faire, and the whole gamut of business ideals. By the close of the 17th century more rapid changes began. Wealthy bankers and merchants had large sums of capital to invest; they put them into making agriculture more efficient and business-like. First in Holland and Flanders, then in England, a revolution in agricultural techniques took place. It was hard enough for the small proprietor to compete; the landlord majority in the British Parliament favored at every turn the progress of agricultural capitalism. The enclosure of the remaining common lands destroyed what was left of the old village economy. The advance in rents during the Napoleonic wars and the subsequent drop in prices sent millions either into the factory towns or upon the great estates as laborers. And as the old families have given way to new commercial investors through the 19th century, the hold of business upon British farming has grown complete.

Where the French Revolution passed, in France and

southwestern Germany, the manorial system has been replaced by peasant proprietors, not landlords and tenants and laborers. Society has taken on the complexion of the small business man, not the large investor. The triumph of the commercial ideal has been equally complete. If in most lands the farmer is to-day struggling to hold his own, it is not the fight to preserve the coöperative rural life of the Middle Ages. It is the struggle of the small business man, unorganized, inefficient, dependent upon his enemies for credit, against the compact ranks of mass production. The farmer is blood-brother to the independent merchant fighting the chain store.

The story of European society in the early modern period is thus the story of the steady advance of business enterprise. Business captured the craftsman, and set up the domestic system. It made of farming a business matter, on either a large or a small scale. It established strong governments to serve its interests. It persuaded kings to lend it armies and navies, and common men to spend for it their lives. It set nation quarreling with nation. It overthrew the holy church. It pushed religion into a backwater, and furnished its own ideals of success. When at length it had grown strong enough to need no further protection, it swept away the very political institutions by which it earlier rose to power. To do so, it had to call upon a new ally. That ally was ready at hand, triumphant natural science. To the steps in its emergence we must now turn.

If the new values and new institutions that set modern Europe off from the Middle Ages came from the natural growth of economic life, the new beliefs and

the new faith in natural science owe much more to an outside source. The great intellectual revolutions that moulded our modern world were stimulated by the discovery of the thought of the Greeks. First, in the 12th and 13th centuries, men found Aristotle. The systems of the scholastics, of Thomas and Duns Scotus and the rest, were constructed when Christianity could still assimilate new elements. They organized a realm of the mind around men's religious and social life. The second intellectual revolution sprang from the absorption of Alexandrian science, the mathematics, astronomy, mechanics, and physics of the Hellenistic age. It built up a system of beliefs useful for trade and commerce, a technique of prediction and control, of manipulation. The main outlines of that system were completed when Isaac Newton in 1687 published his *Principia Mathematica.* They lasted without serious modification till the coming of evolution; scientists are just shaking off their hold to-day.

Both the human science of Aristotle and the mathematical science of the Alexandrians came to Western Europe at the same time, with the discovery of the learning of the Arabs in the 12th century. By 1200 a number of translators and compilers, of whom Gerard of Cremona was the most prolific, had made available in Latin the substance of that Greek wisdom preserved and added to by the Moslems. Their work was chiefly carried on in the two places where Arabic and Christian culture touched, Saracen Sicily and Moorish Spain. At the most renowned school of the 12th century, in Chartres, eager scholars showed an almost equal interest in the logical writings of Aristotle, the humanistic literature of the Latin poets and orators,

and the mathematical and medical writings of the Alexandrians. When it came to working them into the existing life of the mind, however, these three different intellectual concerns were not absorbed with equal rapidity. Each enjoyed in succession a period of popularity and prestige. From their first discovery each won the devotion of a certain number of scholars. But the powerful synthesis of Aristotle made by far the greatest appeal to the 13th century thinkers. His science, aiming at understanding, contemplation, and enjoyment, at the comprehension of the meaning and significance of things, above all the chief end of man, and rising to that mystic vision of mind which was God, fitted admirably into the religious spirit of mediæval society. It offered a body of independent science about nature which yet culminated naturally and easily in the traditional theology. Learned monks and friars reaching out for more knowledge found it far more congenial than the frivolous secular humanism of the Romans, or the mathematics and astronomy that could have no bearing on human destiny. The schools of Christendom, headed by the great University of Paris, were soon busily engaged in the study of Aristotle and the blending of his thought into a new Christian synthesis.

A vigorous minority, however, were from the beginning attracted by mechanical science. In the 12th century a number of individuals, like Dietrich of Freiberg and Witelo, concerned themselves with optics; some, like Pierre de Maricourt, added also an interest in experimentation. By the beginning of the 13th century this Greco-Arabian natural science was being pursued by a number of Englishmen, and under Robert Gros-

seteste Oxford had become the leading school of mathematical physics. Oxford was conservative theologically; it clung to the earlier mediæval tradition of Augustine and Neoplatonism, and was rather suspicious of Aristotle. Now Platonism was mathematical in its scientific spirit, whereas Aristotelianism was rather biological. Hence the very theological conservatism of the Oxford schools made mathematical and mechanical science more at home than in Aristotelian Paris. Grosseteste and his apt pupil Roger Bacon effected a synthesis of Christian theology with optics and mathematics as interesting, if not so immediately successful, as Thomas's synthesis with Aristotle. The twin pillars of their scientific faith were the conviction that nature is mathematical in structure, and hence must be read in terms of lines and numbers, and that such reading must be checked and extended by experiment.

By the 14th century secular interests were already gaining the upper hand. Scholars were drawn into the struggle for individualism and release from too constricting a faith. The Oxford school were the leaders in this intellectual revolt; in its youth hoary Oxford broke up the mediæval intellectual synthesis. The chief pathfinder of the *via moderna,* William of Occam, left his pupils in control not only in Oxford, but in Paris itself, the former stronghold of the Thomistic system. Occamism or "modernism" spread further to the newly founded German Universities, where it presided at the birth of Vienna and Heidelberg. Though condemned at first as too radical, as Thomism had been before it, this empiricism and natural science was as impossible to keep out as had been Aristotle. It remained dominant at Paris till the humanists triumphed in the 16th

century; it soon forced Thomism and the other 13th century systems into the monasteries.

There were two aspects to this new modernism. On the one hand it stood for a skeptical empiricism that completely demolished in the 14th century the great systems so carefully erected a hundred years before. Gone were all the necessities of reason, all metaphysical entities and distinctions. Nothing could be accounted real or valid that was not an observed fact or relation between facts. Experience was the only test of truth. At the same time the Occamists built up on this basis a positive science of physics that laid the foundations for the astronomy and dynamics of the 17th century. A series of great masters at Paris made notable discoveries in the treatment of motion and falling bodies. John Buridan developed the notion of inertia, and considered gravitation as uniformly accelerated motion. Albert of Saxony tried to formulate precisely the laws of falling bodies and of mass. Nicholas of Oresme took three momentous steps. He invented analytic geometry; he discovered the law of uniformly accelerated motion; he argued cogently for the widely known hypothesis of the rotation of the earth. Thus by 1360 the genius of Descartes, of Galileo and of Copernicus had been anticipated; natural science had reached the level at which it remained till 1600.

Though the ideas of these masters of Paris were taught at the Sorbonne, and in Padua, the scientific center of Italy, no new developments took place. This nascent natural science was obscured by the rising popularity of humanistic literary studies, the second heritage from the ancient world. First Aristotle had won general favor; now humanism reigned supreme, and

kept back the further growth of natural science for three hundred years. When the humanists deigned to take an interest in physics at all, they brought a new reverence for the authority of the unfruitful Aristotelian physics. There was a revival of interest in the mechanics of the Paris masters at the Sorbonne around 1500. It is a fit measure of the scientific ignorance of the humanists to note that both Erasmus and Luis Vives, who studied there, satirized as silly the discussions about uniformly accelerated motion, falling bodies, and infinitesimals.

Before such matters could become the concern of more than a few scholars, it was necessary for the need of a new kind of knowledge to be widely felt. Dissatisfaction was first found with the Aristotelian human and religious wisdom of the 13th century scholastics. Men lost interest in it because it was not useful, of no value to a society given over to business enterprise. It sought to understand the possibilities of the existent social order, while what men wanted was to gain new powers. For a time they were content to explore the forces of the newly enfranchised human nature within them; man in his limitless potentialities was too fascinating to bother with nature. But slowly even this humanism came to seem inadequate for the needs of expanding commerce. Mediæval trade had already amassed a considerable body of technical knowledge, a wealth of experience and facts quite independent of both Thomism and the literature of the ancients. The sextant demanded astronomical tables. Gunpowder brought a science of military engineering. Architecture led to the problems of statics, painting to those of perspective and anatomy. Medicine and surgery grew

apace. The great artist engineers, Leonardo, Michelangelo, Dürer, turned with enthusiasm to these practical matters. Everywhere was felt the need of exact measurement and mathematics. At the same time there was a new appreciation for Arabian applied science, and for the alchemy and astrology that aimed at power. Many were the attempts to achieve by magic that control over nature that men so ardently desired.

Inspired by the success of these techniques, and aflame with the eager hope of greater power, many a spokesman of the new 16th century spirit raised his voice in attack on all useless knowledge. Scholastic wisdom was mere contentious learning, that aimed at victory in idle debate. Logic persuades, but does not discover. Aristotle was not practical; he disdained the hard work of experimenting. Humanistic lore is no better. It is mere delicate learning, ostentatious ornament. It brings no power. Alchemy, magic, is fantastic learning. Its ends are noble, to secure power over nature, but its means are crude. What is needed is a knowledge that will bring power, will render men the masters and possessors of nature, will extend the bounds of human empire over nature to the effecting of all things possible. Francis Bacon, whose words we have been quoting, has won fame for his eloquent statement of this "Baconian" conception of science as power. He was but the most successful mouthpiece of a widespread demand.

The secret, men felt, of such knowledge must lie in the right method. The search for a new and fruitful method to replace the discredited argumentative logic of the scholastics attracted many of the most thoughtful minds. Mere observation and common sense were

not sufficient; they led only to confirmation of witchcraft, alchemy, and old wives' tales. What was needed was a disciplining of the imagination, a faith that would exclude all beliefs that failed to pass the most rigorous tests. If men were to escape the authority of tradition, either in its elaborate theological form, or in the weight of common superstition, they must trust an accredited scientific procedure.

The literature of the 16th century is full of new methods hopefully proposed. Displaying all the customary ignorance of revolutionaries, the humanists relied either on their beloved rhetoric, or counseled mere observation and experiment. But the fruitful method was not that described in the pages of Ramus or Vives or Francis Bacon. When it was finally discovered, it turned out not to be new at all. It was the same method practiced by the Oxford mathematicians of the 13th century, and so fruitfully applied by the Paris physicists during the next hundred years. That method had been kept alive at Padua; it was revived about 1500 at Paris. Leonardo in Italy carefully studied it in the recently printed works of the old Paris masters, Albert of Saxony and Buridan; in his notebooks appear its two essentials, the faith in the mathematical structure of the world and the necessity of analyzing observed instances. Inspired partly by Leonardo, partly by the Paris school, there was carried out in 16th century Padua a thoroughgoing criticism of Aristotelian logic and physics. Tartaglia, Cardano, Scaliger, Benedetti, Zabarella, and others taught the 14th century dynamics. The humanistic urge sent them back to the ancients from whom that science had originally sprung. Men read once more Archimedes and the

Greek astronomers, paying especial attention to their methods. It is significant that almost all the 16th century scientists, from Copernicus to Galileo, were associated at one time or another with Padua. Thus modern natural science was not in fact a new departure, but a continuous development from the mechanical teaching of the Middle Ages, itself inspired directly by the achievements of Hellenistic thought.

One novel element went into its building, to provide the underlying drive behind the new pioneers. It was the faith in an all-embracing geometrical order of nature, the conviction that the real world consists of simple mathematical relations, and that what is not so ordered is not real. This is the faith of the physicist. Upon it has been founded every discovery, every triumph of technology from Copernicus to Einstein. It was the mathematical, Pythagorean element in Neoplatonism, the dominant philosophy of the humanists. This the pathfinders of modern science learned from their literary contemporaries. That nature is a simple mathematical harmony was a wild guess, but it worked.

On such a basis the new fruitful method was actually worked out. Science was a body of mathematical demonstrations, of deductions from axioms based on the analysis of a few simple observations. In the classic example of Galileo, the scientist was to roll a ball down an inclined plane, to analyze its behavior into its simplest mathematical relations, and from those propositions build up by demonstrations a system of dynamics. That science was a deductive system, that verification proceeded by fitting a new belief into a coherent body of truth, was not new; it was a convic-

tion carried over from Aristotle and the scholastics. The break with scholasticism came in the insistence on mathematics. Mere generalization from observations was not enough; one must analyze them mathematically, and both axioms and demonstrations must assume mathematical form. It was Euclid the geometer who furnished the model.

Thus at last, impelled by the demand for useful knowledge, for control of nature, men came back to the spirit of Alexandrian science. They had a faith and a method; the discoveries followed in due course. Though both faith and method have been broadened and enlarged, science has ever since meant primarily just such a conviction of the supreme value of certain procedures. The conflicts into which it has entered with other beliefs have been deeper than the rivalry between particular theories and hypotheses. They have sprung from that basic faith in what constitutes truth, what makes genuine verification. With the authority of tradition or church, science has at times been willing to share men's allegiance; but within its own realm that authority it has never been willing to admit. The subsequent progress of science has been primarily the steady extension of the realm to which its own faith alone can apply.

Once such a faith was kindled, the scientists went on to formulate an intolerant and radical metaphysics, a new philosophical picture of the world that brooked no rival. For them, there were carried out in the 16th and 17th centuries two great intellectual revolutions. That in astronomy, begun by Copernicus, driven home by the pugnacious old fighter, Galileo, was not merely a new theory about the size and position of the earth.

It meant the basic conviction of the uniformity of nature, the great simple mathematical order of the world. Gone was the mediæval hierarchy of perfections, gone the old distinction between the earth and the heavens. Earth, moon, planets and stars were governed by the same mathematical laws. Though the earth for Thomas and Dante had been the center of the Universe, its rank had been lowest of all. It was imperfect and mutable, the heavens perfect and changeless. Now, as Galileo's telescope revealed the mountains on the moon, the blemishes on the sun, the satellites of Jupiter, the earth took its place too in the heavens. We are apt to think of the Copernican theory as lessening the dignity of the earth and man, now lost in an infinite universe. In reality, it for the first time made the earth and man's interests central in value, the proper sphere of science. As Galileo said, "Copernicus makes the earth more noble and perfect, he places it in the heavens, as a planet, a divine star!" This was the real break with tradition. Practical science, man's concerns, were now as important as heavenly things, as theology and contemplation. The whole impact of the uniformity of nature was humanistic. It gave man a new glory in his world. When Spinoza, who most clearly of all read the implications of the new science, proclaimed that "the human mind has an adequate knowledge of the infinite and eternal essence of nature," he was giving to man's mind transcendent importance. When the scientist claims that the science that drives factories and builds machines is the final knowledge, he is elevating a human technique of control into ultimate cosmic truth. No religious thinker

has ever dared attribute such cosmic importance to man's petty interests.

Following fast upon this revolution in astronomy came one in physics, proclaiming not only the uniformity of nature, but also the reign of immutable mechanical law. Implicit in Galileo, it was fully formulated by Descartes in 1637. The world is to be explained wholly in terms of mechanics. "Give me matter and motion," he said, "and I will construct the universe." What cannot be clearly and distinctly conceived as the result of the physical impact of particles of matter, is not real. The world is a machine, a great cosmic clockwork. In it are no purposes, no spirits, no human volitions, nothing but mechanical action.

This new faith of 17th century science was negative and intolerant. It excluded from nature most of the things the mediæval thinkers had found there. But it was also purifying. It cast out the mass of superstitions and magical forces that common sense had so often confirmed. It led the scientist to concentrate on what could be dealt with by mathematics and mechanics. It offered an unrivaled technique for the practical control of nature, for making it serve human purposes. The world had become a great machine, an affair of levers and cogwheels to be manipulated. Every triumph of applied science has come from this mechanistic faith. But—as an ultimate answer, it was not only a faith, a colossal unprovable assumption, as such destined to come into many a conflict with men's religious and moral faiths. Judged in the light of our subsequent experience, it was obviously and demonstrably false. For two hundred years philosophers toiled to under-

stand such a narrow and exclusive world. Then Kant proved it absolutely unintelligible; no manipulation, no science was either possible or conceivable in such a world. Finally, the last generation of physicists have themselves rejected it. The electrical world of our modern laboratories cannot be comprehended in terms of the assumptions of 17th century mechanics. Mechanics appears, to our more sophisticated enlightenment, not *the truth,* but an enormously useful technique of analysis and control.

The Cartesian revolution left one great purpose in the universe, the will of the God who created the cosmic machine; and one alien substance, the human mind. Even in the 17th century Spinoza saw clearly whither the logic of the new science led. He consistently put the soul too in nature, as one cog among many, and he identified God with the very order of the world. But the majority even of scientists it took a century of careful criticism to bring to recognize the logical implications of their faith. When men in the late 18th century saw keen thinkers like Hume, Holbach, and Kant reach the same inevitable conclusions, they drew back in alarm.

But not many are so governed by logic that they will think a strange idea through to the bitter end. By 1650 the new science popularized by Descartes had gained enormous prestige with the vast majority of educated men. He had revealed its basic assumptions, he had pointed to the vision of what it might become. But Descartes himself had not been able to solve all the problems. It took a generation of eager investigation after Galileo to consolidate the new beliefs.

Finally in 1687 Isaac Newton was able to publish the *Mathematical Principles of Natural Philosophy*. By the happy discovery of a new mathematical technique for handling motion, the calculus, he was in a position to fit all the empirical discoveries of a century in astronomy and physics into one mathematical system. The ideal of the Alexandrians, of Grosseteste and Roger Bacon, of the 14th century Parisian physicists, was at last achieved. The phenomena of nature, Newton proudly announced, could now be subjected to the laws of mathematics. Nature was in very truth a harmonious world-order, a tissue of properties, precisely ordered, of which the connections could be expressed in terms of mathematics.

The system of beliefs popularized in the name of Newton, the Newtonian mechanics that dominated science until the biological discoveries of the 19th century, and that reigned in physics even longer, was sublimely simple in its main outline. The world was a great mechanical order. Its fundamental constitution was the laws of motion. Solid massy particles, like billiard-balls, in their constant impact and reaction produced all the phenomena we can observe. Created complete at some moment of time by a great watchmaker God, it followed without change the unrolling of its cyclical processes. Nothing new ever really happend, nothing developed. The circling planets were the symbol of the uniform and unvarying course of nature. In such a world the task of the scientist was to discover the simple mathematical laws in accordance with which events occurred, and fit them, as Newton himself had done, into a single demonstrative system. His ideal

would be achieved when every branch of human knowledge had achieved the logical completeness and beauty of the books of Euclid.

No wonder Pope voiced the common admiration for Newton in extravagant terms:

> "Nature and Nature's laws lay hid in night;
> God said, Let Newton be, and all was light."

Others too had labored to furnish mathematical proof that the universe was a vast perpetual-motion machine; but Newton reaped the harvest. Eighteen editions of the *Principia* were sold before 1789. That was a hard work, more suitable for the bookshelf than the hand; the number of popularizations was legion. By 1789 forty had appeared in English, seventeen in French, eleven in Latin, three in German, one each in Portuguese and Italian. Most popular of all was Count Alogrotti's *Newtonianism for Ladies,* which ran through edition after edition. Newton's name was the symbol for the new machine-universe, the last word in science. His conclusions, his picture of the world, his scientific faith and method were accepted on authority. Here at last was a worthy system of beliefs for the new commercial world.

VII

THE FIRST ATTEMPT AT ADJUSTMENT AND ITS FRUITS

In the 18th century the first thoroughgoing attempt was made to reconstruct the traditional institutions of European society in the light of the demands of the triumphant business spirit and of Newtonian science. All the earlier readjustments had been makeshifts, largely negative. Men had been driven to revolt against their inherited institutions chiefly by the imperious economic urge to individualism. What theories they had turned to for justification had been fragmentary and contradictory. Now at last the rising middle class was possessed of a powerful and well-organized instrument of criticism, and an adequate intellectual basis for a new social organization. The time was ripe for a conscious attempt at cultural readjustment. The major changes had already taken place; the new scientific spirit to consolidate and extend them was ready at hand.

The whole enterprise of fitting the currents of commercial life into the older tradition by means of Newtonian science, is known as the Enlightenment. It represented, on the one hand, the rapid spread of the ideals and standards of the enterprising business man through all classes of society. On the other, it stood for the swift popularization of the tests, the

intellectual model, and the scientific method of Newtonian mechanics as the only respectable manner of treating any problem. For the first time there emerged a complete middle-class culture, founded on natural rights, individual liberty, and the worship of reason.

This alliance of the middle class and the scientific spirit has been of incalculable significance for the civilization of our day. It meant that a definite and intellectually imposing expression was given to the ideals of the business man. It meant also that the great enterprise of applying the scientific method to social problems was carried through with a single-minded attention to the interests of the middle class. The new social sciences which it was the intellectual glory of the Age of Reason to establish, became the creed of the merchant and business man. They were bent to the service of private gain and commercial prosperity.

This science of society determined the attitude with which men fought the political and economic revolutions of the closing 18th century. It presided at the constitutions they wrote and the economic creeds to which they subscribed. It cast into rigid and unchangeable "laws of nature" the particular aspirations of business men and independent farmers in the 1770's and 80's. Following the model of Newtonian mechanics, it built a hard, narrow, and inflexible system, founded on deduction from accepted axioms and irrelevant to experimental verification. The transitory demands of society in 1770 were crystallized into immutable truths. It was with such a set of convictions that men were left to face the strong new currents of the industrial revolution. It is little wonder that they proved utterly incapable of dealing with such different

problems, and that it has been a terrible struggle throughout the 19th century to apply intelligence to social affairs.

For the forms of our political and economic thinking, and the very structure of our social organization, have to this day remained largely unchanged. In a very real sense, the foundations of our world were laid in the 18th century. Only a small number, mostly in academic circles, have ever come to think in other terms. In courts, in legislatures, in banks and offices, in newspapers, the social ideals and the political and economic science worked out for the merchants and farmers of the Age of Reason still reign. Under those ideas business triumphed in the 18th century; they are still good enough for the practical business man. As a result, our social ideals and institutions still bear the strong impress of Newtonian science,—rigid, deductive, inflexible,—and of the private self-interest and selfish, irresponsible competition of that earlier commercial age. The science of Newton has been transformed, and is to-day crumbling; commercial individualism has given way to industrial organization. Yet all that the vast majority of us possess to face the problems of the present are those weapons of a bygone war.

With such uses, Newtonian science won enormous success in the commercially-minded 18th century. It was the only time when science was ever really popular; for there have since grown up doubts, reservations, divergent interests. Intellectually, the spread of its rational spirit and method marks the real break with the mediæval tradition. The scientific criticism and reconstruction of the past then carried out went

far beyond the compromises of the Renaissance and Reformation. The 17th century pioneers had erected science into a dominating system; but they were too fascinated with the order of nature to do more than brush man himself impatiently aside. Now arose thinkers with an intense interest in human concerns, who applied the new conceptions and methods to the study of man's own nature and institutions. If Newton remained throughout the 18th century the very symbol of the triumphant science of nature, the name that stood for this new science of man was that of his contemporary John Locke. Together Newton and Locke were the intellectual gods of the Age of Reason. As Voltaire said, Locke taught men that it was possible to carry the geometrical spirit everywhere without the hard discipline of mathematics. And carried it was into every field, into business, politics, religion, morality, poetry, painting—nothing was exempt. Still intoxicated by the discovery of the harmonious order of nature, eager thinkers sought a similar order in human affairs. Since nature had been found to be orderly and rational in structure, whatever was reasonable must *ipso facto* be natural. So men sought a natural order in all things, —a natural religion, a natural morality, natural rights and natural laws of wealth. And as it was the business man to whom things had to appear reasonable, this natural order was easily identified with commercial prosperity, gain, and wealth. Nature and Reason were used interchangeably as the standards by which to judge the past. All that was unnatural, all that was unreasonable, all that was unscientific, to a commercial society, went by the board.

The scientific, rational spirit of the Enlightenment

measurably succeeded in politics and economics. There it completed the disruption of the mediæval social world. Natural rights, natural laws of property and free competition, were the battle-cries under which the middle class swept away the last restraints of feudalism and the guild and manorial systems. The political changes of the English, the American, and the French Revolutions threw up constitutions which officially embodied the individualistic demands of commerce for personal liberty, non-interference, free competition, and laisser-faire. To be sure, these hard-won liberties subsequently prevented an effective social control of the machine and the factory. But for a brief interval they stood as satisfactory adjustments to the economic and social needs of the day. They still furnish the forms in which the core of the Hebrew-Christian moral tradition has come down to us. In the ideals of personal rights, of human liberty, of democracy, we still feel the pulse of the prophets' righteousness and the gospel love of man; and when they seem somewhat tarnished by the smoke of an industrial world, we cannot but feel the very heart of our civilization assailed. The Age of Reason failed, and failed miserably if instructively, in its attempt to make art and religion scientific; but before we turn to this liberating failure, let us examine the temporary success which crowned its efforts to make social life reasonable and humane.

By the 18th century the middle class had grown strong enough to find the restraints of a paternalistic economic regulation irksome. They no longer needed protection against the feudal barons who had disappeared. The arbitrary exactions of their erstwhile defenders weighed far more than the help they gave.

What business wanted above all things was the right to manage its own affairs without interference. Around each merchant and each craftsman should be drawn a circle, within which no other agent might step. In the full confidence of prosperity and rapidly improving techniques, men were willing to take their chances of gain without tariffs, bounties, or rigid prescription of standards. They wanted the freedom to follow their own self-interest, confident that no other man knew their business so well as they themselves.

The landholders were no longer to be feared. They had become either business men themselves, fully as anxious as the merchants for the liberty to improve their condition; or else mere courtiers shorn of real power, the possessors of vested privilege derived from an earlier day. In England their privileges were chiefly political; elsewhere they were economic and social as well. With this official caste of nobles the business men demanded equality; they too desired to be numbered amongst the ruling class.

Moreover, merchants and farmers showed a growing impatience with those practices which interfered with trade and gain. As business enterprise pushed religious interests into the background, religious persecution and discrimination seemed more and more senseless. Often the leading merchants were themselves members of unrecognized sects. Intolerance subsided as religious passions gave way to a common pursuit of prosperity. Warfare, also, and dynastic rivalry seemed to bring heavy taxes disproportionate to the gains of colonial trade. National boundaries were mere excuses for useless tariffs. Toleration, peace, cosmopolitanism, seemed quite naturally bound up with further progress.

In such an atmosphere were worked out the generous ideals of the Age of Reason. The commercial energy of the 17th century had brought an unprecedented prosperity and wealth. Competition was not yet as bitter and ruthless as it was to become under the machine. The middle class, still struggling for power, had not yet felt the smug complacency of entrenched position. It could afford to generalize its demands into a universal program for all mankind. It needed, moreover, all the help it could obtain. Hence it listened with enthusiasm to the humanitarian prophets of the age.

The Western moral tradition received its last great reconstruction in the Enlightenment period. Most of the characteristic ideals of the 19th century and later were formulated by the Voltaires and Rousseaus and Jeffersons of the Age of Reason. Human freedom, the equality of man, democracy, toleration, peace, and progress,—all have reached us through the filter of 18th century benevolent altruism and humanitarianism. There was much in the reigning scientific spirit that proved congenial to such a reconstruction. For the first time, under the impulse of Newtonian mechanics, Western society achieved a purely secular ethics. Where the earlier commercial society had still demanded a religious sanction for its devotion to thrift and gain, men were now ready to find in the great Order of Nature sufficient authority for their chosen ends. Many an attempt was made to build up a system of natural or rational morality. For some, the model was mathematics, with its indubitable axioms. For others, the method of mechanics, which demanded an initial analysis of human nature before proceeding to a demonstrative system, seemed more applicable.

Actually, of course, all these systems of ethics involved the application of the tests of science and commerce to the Christian tradition. What in the inherited standards seemed "useful" and "rational" turned out to be the precepts of nature graven in each human heart. The many elements of the Hebrew-Christian tradition that could not justify themselves to the critical mind of the enlightened middle class were pruned away. The Sermon on the Mount, the fierce longings of mediæval asceticism, the socialized love of the 13th century, the harder parts of Puritanism, disappeared in the light of reason. What was left was a narrower and more systematic formulation of the ethics of the soberer humanists,—a scientific version of Erasmus's "philosophy of Christ."

What was natural and reasonable, to both a Voltaire and a Bishop Butler, was benevolence, utility, the pursuit of happiness. The dignity of labor, the enterprising shrewdness, the pursuit of thrift and gain, the individual responsibility, which in the Puritan way of life had so admirably expressed a sober commercial spirit, still made an appeal to the Age of Reason. But the this-worldly asceticism of the Puritan was swept aside. A certain measure of worldly prosperity had loosened the austerity once held necessary. Nature could now be trusted; she was a generous mother whose gifts were bestowed to be wisely used. Natural instinct, in an atmosphere where the rationality and harmony of nature were worshiped, could not lead man astray. Let it be guided by reason, let it be enlightened. But man were wisest to follow the promptings of the desires with which nature has endowed him. Reason enters to elaborate the means. In the simple psychology of

the day, man desires, of course, pleasures. Let him then use reason to organize his pleasures into one all-embracing happiness. Let him pursue his enlightened self-interest. The rational harmony of nature will insure the good of all.

The order of nature thus relieved men of the necessity of moulding a social order of their own with patient care. It left its stamp even deeper in the universality it imposed. There is one uniform order in nature; there is a similar uniformity in human affairs. All desires are on the same level; push-pin is of itself on a par with poetry. And the worth and value of each man is the same. Moral laws are universal; duties and rights are for the Frenchman just what they are for the Chinese or the South Sea Islander. The uniformity of Newtonian mechanics lent itself naturally to the expression of the middle class demand for equality with the rulers. It made for a mechanical democracy that was consumed with passion for the rights of Man. National distinctions, patriotic prejudices, artificial privileges, all fell before this leveling urge. "All men are created equal"—so ran the party platforms.

Such a democratic emphasis on the moral worth of the individual man could never so easily have grown up in the complex hierarchy of present-day industry. In the light of our science it seems often absurd. In a society of merchants and farmers confronted by a degenerate privileged class, it was a natural conviction; in the intellectual atmosphere of Newtonian science its leveling uniformity was inevitable. It was the form which the message of the prophets and the gospels had to assume in the Age of Reason. Despite its crudity of expression, it has entered deeply into our

own moral life. Though we can no longer understand it, and are farther than ever from embodying it in our institutions, we cannot choose but believe in it. We still thrill to that Enlightenment ideal.

With minor variations these humanitarian and democratc standards were accepted by the skeptic and the religious alike. To the latter they seemed the natural interpretation of Christian love. For in very truth they were neither new nor revolutionary. They were the rationalization of the great Hebrew-Christian tradition. What they questioned were the many variations and departures that had grown up through centuries of diverse conditions. Now at last the Christian moral tradition had been reduced to its rational core. And though this bare residuum of necessity took on the coloring of the particular needs and intellectual habits of the 18th century, a hundred years of science have not suggested much further modification. If we are to go to that tradition for our moral inspiration, rejecting what is incompatible with science and business enterprise, these are the values we shall find. If in our present difficulties they appear insufficient, then we must look elsewhere for more.

When it came to embodying this natural moral order in social life, the business men of the 18th century tried several types of political machinery. The simplest device, to which they turned earliest, was government by the political expert. In any age of political maladjustment the first recourse is to the seductive dream of the philosopher king. Find some ruler who shares your own wisdom, and give him the power to remould society according to your desires. It seems so easy to introduce reforms by fiat from above, and so hard to

work with the creaking machinery of representative government. From Voltaire down, hardly a Frenchman in the 18th century who visited England and admired its freedom and secure personal rights, but dreamed of getting an enlightened monarch to carry them to the rest of Europe. The century-long struggle through which they had been won meant nothing to their political inexperience; the oligarchical and corrupt British Parliament inspired only curious disgust. How much better for such rational institutions to be introduced by the scientific wisdom of a Frederick the Great, a Catherine II, or a Joseph II!

There was much to be said in the Age of Reason for the philosopher-king. Everywhere, outside Great Britain and a few small states, absolute monarchy was the political system inherited from the earlier days of the commercial revolution. Under such strong rulers business men had won their first victories. The Renaissance despots, to be sure, had possessed no science; they had not known the proper measures to take. In their time the natural order of human society had not yet been discovered. But could not the same wise rule of personal monarchs be carried over into this day of science and reason? Could not the monarch himself absorb the new science of society, and qualify as the expert political scientist? Arbitrary, capricious despotism, unpredictable petticoat rule,—that was the worst of governments. But the absolute rule of the expert, the scientist, who had discovered the natural order of society, and knew the immutable laws of political economy,—that was the best. Such a ruler would establish a body of magistrates to investigate and apply the scientific laws of society. He could far surpass the chance re-

sults of English constitutionalism without any of its cumbersome machinery. He would govern his realm by reason, as God himself unchangeably governed the whirling planets.

In Prussia, in Spain, in Russia, and in many a smaller state, enlightened monarchs sat upon the throne. They lent a ready ear to the promptings of their middle-class supporters. The remaining mediæval organization of business, which no one wanted, they consented to abolish. Laisser-faire and free competition, public improvements and public education, religious toleration and internal free trade,—most of these middle-class demands they seriously considered. In places, like Prussia, some were even cautiously adopted. Frederick had no patriotic prejudices; he gladly welcomed foreign scholars. To be sure, these crowned experts were not able to avoid recurrent warfare; but for that they were hardly to blame. Finally the most benevolent and idealistic of all, Joseph II, sat on the throne of the Cæsars at Vienna. Why should a business man or philosopher of the Enlightenment pay much attention to the reactionary Parliaments of George III? It was by other means that the middle-class millennium was to be achieved.

Yet, in spite of all these enlightened experts accomplished, in spite of what even the most revolutionary, Napoleon, was able to bring about, it was the tradition-bound, rotten-borough, bribe-taking and bought British Parliament that was to furnish the political institutions for the commercial world. The philosopher-kings were tried and found wanting. The most enlightened of all, Emperor Joseph II, was the most miserable failure. He aroused his whole people against him. Yet the very

reforms which raised a rebellion in the Netherlands were gladly accepted less than ten years later when the armies of the French Revolution brought them as the rights of man. The continental philosophers were mistaken. The British constitution did have something to do with its fruits of liberty and toleration. There is that in human nature that will not accept the wisest reforms when imposed from on top.

The failure of the device of the political expert was hastened by the sad fact that no ray of enlightenment appeared on the French throne. Louis XIV's successor was Louis XV. No French advocate of scientific monarchy could blink that fact. Though his well-meaning grandson tried at last the popular remedy, and called on the social scientist Turgot to save the day, it was too late. France went into the hands of a financial receiver, and the business men were called on to carry through their adjustment themselves.

If the first political device to which the Age of Reason turned was the absolute monarchy of the Renaissance enlightened by social science, the second was the scientific version of an even older mediæval tradition. Before the royal power had become supreme, practically every state had possessed some form of representative body to watch over the rights of the different classes. The English Parliament, the French Estates-General, the Spanish Cortes, were typical of these feudal institutions. Most of them had at one time or another exacted certain definite guarantees of rights from the king. Magna Carta was merely the most famous of these written formulations of political rights. But in the assemblies dominated by feudal barons and clergy, the interests of the townsmen usually received

short shrift. Therefore in most lands at the time of the commercial revolution of the 16th century, the merchants had preferred to support the king's authority against these conservative representative bodies. Of the large states, only in England had Parliament survived the first era of commercial expansion under the Tudors with much real power. In some of the city-states of Italy, the Germanies, and Flanders, such constitutional government had so early been captured by the business interests that there was no real reason to appeal to royal power. Here too, therefore, in Venice and in Genoa, in Frankfurt and Bremen, there had lasted a form of government different from the widespread absolutism.

Even in the 16th century the commercial ports of the Netherlands were driven to try constitutionalism. Fallen by chance under the control of the alien Spanish crown, Flemish and Dutch merchants could not well follow their English and French colleagues in supporting the king. Their king, Philip II of Spain, was committed to Spanish interests. They had every reason, commercial, religious, nationalistic, to appeal to the ancient mediæval privileges against him. In the bitter struggle that resulted the Dutch worked out a representative, constitutional government, admirably fitted to the needs of the middle class. In justification they developed a political theory of natural rights that set definite limits to governmental powers. During the 17th century, the era of Holland's greatest commercial prosperity, these Dutch institutions and theories served as models for aspiring townsmen elsewhere.

In England, also, the merchants who had so valiantly

supported the Tudors found themselves drifting into opposition to their Stuart successors. Here too the fight for religious liberties played a part; Protestantism and business enterprise were in the early days so intertwined that it is impossible to separate them. English business was now so strong that it set freedom from interference above the king's protection. Finally in 1689 it won all its major demands. Its complete control over its own affairs was recognized; its religious sects were tolerated; its power to check the king by refusing taxes was affirmed. Most significant of all for the further growth of constitutionalism, its position was scientifically set forth by John Locke.

In Locke's apologetic for the business man's revolution of 1689, the theory of constitutional government and natural rights was for the first time formulated in terms of the concepts of the new natural science. Locke revered Newton and tried to employ his method. He undertook a scientific analysis of human nature and society, on the model of mechanics. In human society, as in the stars, there is a harmonious order embodied in the law of nature. The law of nature decrees that all men have the right to dispose of their property—their life, liberty, and estate—as they think fit, without asking leave of any other. No limits are set upon their freedom of action except that they must not interfere with the property of another. Where there is no government, every man has the right to defend his natural rights of property against every other. But since much confusion would result were there no definite authority to proclaim these rights, to judge when they are infringed, and to execute that judgment, men

have agreed, by concluding a "social contract" among themselves, to set up a civil government. The sole end of government is therefore to preserve men's natural rights of property and free action. When a government itself transgresses against men's natural liberties and properties, the people have the right to resist by force, and to establish a new government that will confine itself to the task of enforcing men's natural rights.

Locke thus set forth in classic fashion the theory of constitutional limits upon the powers of government. This was the freedom for which the English had fought their long struggle against Stuart absolutism and Puritan Parliaments. The men whose revolutions Locke was interpreting in the light of Newtonian science did not care particularly for self-government. What they wanted was to restrict any government within as narrow limits as possible. Protection should be furnished against the robber; aside from that, men should be left to their own pursuit of gain. The program of middle-class merchants and farmers could hardly have been put more clearly. And who could oppose a law of nature?

The best device to insure such non-interference was a system of checks and balances. Set up a Parliament to watch the king, and neither can oppress the people. Montesquieu in France further elaborated this theory of the separation of powers. The English government was a model because it could do almost nothing, and hence rarely did anything bad. The Crown, the Lords, the Commons, and the citizen juries each had enough power to prevent the others from infringing on men's inalienable rights. Montesquieu hoped that France would revive her even more complicated "gothic" or

mediæval government. Thus freedom would flourish without any fear of tyranny or mob-rule.

The American revolution reaped the fruits of English experience and English theory. It was a definite protest against mercantilistic regulation of commerce, in which the colony always suffered. It took place among a people whom pioneer conditions had accustomed to regard practical liberty of action and freedom from interference as obviously rational, natural, and divine. Locke's ideas became the commonplaces of American political thought. They were used against both the commercial and taxing policies of Parliament, and the King's executive action. Jefferson wrote them into the Declaration of Independence, as the best expression of the American mind. All agreed that the sole end of government was security to the persons and property of the governed.

When it came time to draw up the Constitution, however, the lawyers and merchants and wealthy landholders gathered in convention feared the tyranny of a ruler far less than the tyranny of a mob. With rare skill they labored to protect the property rights of the individual against an unwise majority. Into the new instrument they carefully inserted all the checks and balances they could devise. There emerged a government admirably adapted to secure and defend the right of private property and to prevent any change in its existing status. American business has ever since prospered under the political institutions of 1689. If it has been more difficult in America than elsewhere to achieve some form of social control over the forces of a titanic industrial society, that is but a new tribute to the sagacity of the founding Fathers. To prevent any

social control of business is just what they intended. They were very well acquainted with the fundamental needs of society,—in the 18th century.

Though a third political ideal, democracy, emerged in the late 18th century in France, it can scarcely be said that universal suffrage and majority rule are a real part of the Enlightenment attempt to reconstruct society. The story of their adoption belongs rather to the next hundred years. Rousseau's political theory was in fact far ahead of its time. His clarion call for popular sovereignty found an answer in 19th century nationalism. His deification of the will of the majority, against which no man can protest in the name of individual rights, is embodied in the practice of the modern collectivistic state. It is easy to see why, in our struggle between the English tradition of individual liberty and this Rousseauian conception of the omnipotence of a majority, it has been Rousseau that has conquered. His views alone offered the prospect of some effective control over industrialism. But in the 18th century, even in the French Revolution, where Rousseau's theories played an important part, this will of the people that could override expressed opposition created no democratic institutions. It was used only to justify dictatorship in the interests of business. And though in America the aristocratic government of the Federalists gave way to the democracy of Jefferson and Jackson, that early American pioneer democracy was not the industrial program we have since learned to know. Jefferson called the landed gentry, Jackson the frontiersman and the craftsman, to fight for their rights against the merchants and bankers. In both cases it was a demand, not for more popular control, but for

less government in business. This first American democratic movement was simply another return to Locke, a further protest at too much government.

Ultimately of greater importance than the erection of new political institutions that have been in their turn outgrown, was the achievement of a new social method. Toward the close of the Age of Reason a few men in France and England, notably Jeremy Bentham, formulated what they called the Utilitarian attitude. They shared the common aim of the middle class, freedom from social control. In their ideas of the proper ordering of society they differed but little from their fellows. Their crude attempts to formulate a science of human nature on the Newtonian model have stood the tests of time no better than the other 18th century psychologies. Yet they are distinguished in one particular: they achieved a far more flexible method for dealing rationally with social affairs. Unlike Locke and his orthodox followers, they did not ask of traditional institutions, are they part of the law of nature? are they embodied in the natural order of society? Instead, they questioned, are they useful? Do they make for the greatest happiness of the greatest number?

The Utilitarians alone, of all these theorists, felt that human society could afford to rest squarely on a rational basis, without bringing in either nature or God to give it firmer support. They had a greater faith in human reason than any of the others. For them, the task of social readjustment was not to find the laws God had made for human society, but to imitate him: to make the necessary laws. To them, whether any scheme of society was natural or divine was unimportant. What counted was whether it was socially useful

and answered the needs men really felt. What the other middle-class theorists were doing without full awareness, devising new institutions to suit a new commercial day, the Utilitarians were intelligent enough to undertake quite consciously. Find out what men desire, and devise rationally the forms to secure it.

Such a method does not crystallize the demands of the moment into immutable scientific truths. It avoids the fixity of an order of nature that cannot assimilate new forces. It has no natural rights to remain as obstacles to further adjustment. It is a program for investigation, and it can adapt itself flexibly to any situation. The great institutional revolutions of the 17th and 18th centuries were not, to be sure, effected in this Utilitarian spirit. To bring them to pass men called God and nature to the defense of business. But slowly that method has won acceptance amid the rapid changes of the 19th century. Of all the Enlightenment theories in social science, the Utilitarian attitude alone has been able to adjust itself to experimental science and an industrial world.

In attempting to create a science of human society, the Age of Reason was combining the two most vital currents in its cultural life. It was using the intellectual force of Newtonian science to adjust its inherited moral, economic, and political institutions to the rising stream of business enterprise. If the new social organization thus effected later proved hopelessly inadequate to the demands of mass production and urban communities, it at least was a genuine response to the needs of the time. The same can hardly be said of the other reconstructions of the Enlightenment. The 18th century attempt to adapt the artistic and the religious

life to the standards of scientific thinking and the temper of commercialism resulted in failure, a failure that provoked the poet and the religious man to open rebellion. The vigorous reaction against the scientific spirit of the Age of Reason that spread finally to every field, began first in art and religion. "Classic" art and "rational" religion have stood throughout the last hundred years as the very symbols of the narrow and meager mechanical synthesis of the Newtonian era. If even during their popularity they displayed none of the rich vitality of the contemporary social reconstruction, the failure of these mediating compromises must be laid to the poverty of artistic and moral inspiration in the Age of Reason. Science and commerce came to them almost wholly as disintegrating forces. They did not result in fruitful new combinations with the older traditions of the Renaissance and the Reformation. They merely led to the abandonment of element after element of the past, until both the artistic and the religious life were greatly impoverished. To reduce poetry to Pope and Christianity to Voltairian Deism may have been a purification, but it stifled and killed. The great Romantic movement in art, the evangelical movement and the Catholic revival, deliberately turned their backs on such constricting scientific standards to plunge once more into the stream of rich and living experience.

The artistic outburst of the Renaissance was already subsiding when the scientific spirit entered art. The same impulse that led to the rapid spread of Cartesian science in 17th century France fostered the rationalism of the classic ideal. The year 1637 saw the appearance of both Descartes' *Discourse on Method* and Cor-

neille's *Cid*. Poets and painters and architects imitated the absolute monarch Louis XIV in imposing law and order on their realms. The rationalism that led men to carry the new science to fantastic extremes, taught them to write poetry and build palaces and gardens in the "geometric spirit." Precise and orderly Versailles set the style all over Europe. Critics like Boileau and Alexander Pope formulated the rules and conventions of the pseudo-classical ideal. Follow Nature,—but to follow Nature meant to follow Reason. Even the creative impulse that had limited itself by rule in the age of Louis XIV and of Queen Anne seemed exhausted by the middle of the 18th century. Only the unities, the manuals and the regulations were left.

The effect of the scientific attitude was to emphasize craftsmanship and technique at the expense of artistic imagination. The best work of the 18th century is just that where skill counts more than vision,—in the devising of refined instruments of living for the newly prosperous classes. Furniture, textiles, ceramics, interior decoration,—here the craftsmen of the Age of Reason excelled. Condillac was but expressing the temper of his times when he said: "A geometer may say, Newton had to have as much imagination as Corneille, since he had as much genius; but he doesn't see that Corneille's genius too meant only that he could analyze as exactly as Newton. Analysis and calculation make the poet, as they make the mathematician. If the material of a play be given, the invention of the plot, the characters, the verse, is only a series of algebraic problems to be worked out. What is genius? Only an exact and clear mind, that can work out what no one could before."

In such an atmosphere the matter-of-fact commercial spirit felt at home. It could appreciate honest craftsmanship where the touch of genius left it cold. It could cart the stained glass of Chartres to the rubbish-heap, to let more light into the choir. It could sympathize with Fanny Burney's Evelina in her desire to tear down the damp and gloomy "gothic" monstrosity of York Minster, and build another in the sensible style of Palladio. It was the great age of the Country House, where an acquisitive class gathered the spoils of other cultures for their passive enjoyment. Art ceased to be what it had been during the Middle Ages, the expression of a whole people's aspiration, and became the enhancement of bourgeois prosperity, the mere decoration and refinement of life.

A new middle-class literature gradually took form. In the theater of Molière the soul of France is dissected and laid bare; and it is not the world of the court or château. The English novel began its great career with Defoe and Smollett and Fielding. The careful details of its broad canvas were devoted to bourgeois life. Middle-class tragedies began to appear on the boards in France, Germany, and England. Didactic poems, unrelieved by imaginative insight, like Klopstock's *Messiah,* satisfied the moralistic taste of still faintly Puritan households. Wit and cleverness replaced poetry, in sparkling comedies, in *vers de societé,* in the *contes* of Voltaire.

The religious impulse of the Puritan movement was also subsiding when the ideals of the Enlightenment took form. Men were not ready to abandon their beliefs or to reject a supernatural sanction for morality; but they were anxious to escape from too insistent reli-

gious passions. The general secularization of life implicit in Protestantism was hastened by the growing absorption in new worldly interests. The religious wars of the 17th century in Germany and England left men disgusted with quarrels about points of doctrine and church government. They were only too glad to welcome whatever would strip the religious tradition of the elements on which sensible men could not agree. No one would contest the validity of the virtues of the new business morality. No one could deny the theological tenets affirmed by the new science. From Herbert of Cherbury to the great Locke himself, there rose a long line of thinkers far more concerned to end religious controversy than to promote the religious life. They sought an irreducible minimum that could cause no social disturbance. For them there was no fierce prompting to find the Kingdom of God. What they wanted was rather the religion on which all good men could agree to live in peace. They turned to science for its tenets, and to business for its ideals.

The religious compromise of the Age of Reason was not the creation of a living new religious synthesis. It was the attempt to strip the religious life of all that was irrational and not obviously of social utility. With so negative an aim, it is little wonder that nothing of distinctive religious value was left. The function of religion for the Enlightenment was simple. Will it make men honest, thrifty, industrious, and law-abiding citizens? Is it of any earthly use? Religion was looked upon, in the scientific spirit, as a set of rational propositions offering an incentive for the business virtues. To such a pass had commerce and Newtonian mechanics brought the great Christian tradition, with all its pas-

sionate feeling and intense yearning after God. Christianity was now a scientific system appealing to the cool and deliberate reason of the man of sober common sense. The inner experience of the Divine, the immediate vision of God's living reality, the bitter longing for redemption,—these were dismissed as unwholesome "enthusiasm," the cardinal sin.

What could keep a man from violating his neighbors' rights, what could pass the tests of scientific rationality, was the religion of reason ordained in the order of nature. With one accord modernistic thinkers set to work to harmonize religion and science. Inevitably what was not scientific, whether it conflicted or not, was pushed into the background. The living Christ, the conviction of sin, the need of redemption, —the very core of the traditional religious system,— disappeared as mere "revelation." They received no support in mechanics. God was no longer an object of aspiration; he became primarily the Creator, the first cause of the machine universe, the ultimate explanation. So accustomed are we to think in scientific terms that we scarcely realize what a theological revolution this implied. Religion not only ceased to be a life, and became a scientific explanation; it no longer explained values, the ends of conduct, but turned out rather to be a branch of mechanics.

It was no new thing for Christian faith to identify itself with the ultimate conceptions of a scientific system. The Fathers had already read God as the Logos of the Platonic science; and when Aristotle was discovered in the Middle Ages, Thomas had interpreted God as the basic assumption of his physics, the Prime Mover. But these systems of Greek science had been

human and ethical. It was neither difficult nor profoundly disturbing to the religious life to see the Christian Loving Father as the rationality of the world, or the end to which the whole creation moves. But to identify the Deity with the brute force of mechanics, was to rob him of every attribute of religious value. He ceased to be the goal or the redeemer, and sank to a mere scientific hypothesis, a theory of explanation. Nor was it long before this hypothesis of a Creator lost even its scientific value.

The 17th century physicists were the leaders in identifying God with the postulates of mechanics. God, proclaimed Henry More, is the space of the laws of motion. God and space both possess twenty identical attributes. Each is "one, simple, immobile, eternal, perfect, independent, existing by itself, subsisting through itself, incorruptible, necessary, immense, uncreated, uncircumscribed, incomprehensible, omnipresent, incorporeal, permeating and embracing all things, essential being, actual being, pure actuality." They must be the same. No, said Robert Boyle; God is the ether, the divine force acting in the world that effects all phenomena not taking place by direct contact. Absolute space, suggested Newton, is the mind of God; ether is his will. Nature is really art. God is its creator, its explanation. Why do the planets not fly hither and yon like comets? It must be the effect of counsel. Nature is a machine; and a machine is designed for a purpose. What is the purpose of the watchmaker God who made it? To have order. God's great aim is to establish and conserve law and order. He not only made the universe; he keeps the stars from bumping together as a result of universal gravitation, and from

time to time corrects the subversive forces that would otherwise destroy the law and order of creation. Thus the whole long painful struggle of the middle class was given a cosmic significance.

This first attempt to harmonize natural science and religion seemed eminently successful. Had not the greatest scientist of all firmly established God as the basic concept of mechanics, the first efficient cause or creator? Yet if these mediating modernists of the Age of Reason imagined they had effected a new synthesis destined to as fruitful a development as that of Augustine or Thomas, they were deceived. Such a God, space or ether or intelligent force, soon proved to possess no religious value whatever. It had no moral qualities, it was in no satisfying sense divine. In the hands of the prophets of natural religion who affirmed that whatever is is right, it soon came to be more of a devil than a deity. In Voltaire's *Candide* is embodied the ultimate judgment of the Age of Reason itself on such a compromise. Nor did the very success of the identification with the most speculative side of Newtonian mechanics avail it. Not only were the religious values sacrificed to those of scientific explanation; in the hands of succeeding scientists it proved absolutely defenseless against a better scientific hypothesis. Physics soon abandoned absolute space, a mechanical ether, and a watchmaker creator. More adequate theories, like those of growth and development, took their place. There has been no conflict between the Aristotelian theology of Thomas and the doctrine of evolution. Between the mechanical principles of this Protestant rational theology and evolution, the struggle has been absolute.

Eighteenth century rational religion is a perfect example of how not to harmonize religion and science. It failed completely; but it taught a lesson. Yet we are still told to-day that God is ether, though ether has disappeared from science. Eminent theologians and philosophers identify him with electro-magnetic energy, or creative evolution, or whatever other speculative postulate their systems rest upon. So strong is the desire to merge two diverse interests into one, that we are prone to forget the outcome of that other modernistic venture. We have yet to realize the dangers of reducing religious faith to the compass of passing scientific theory. The religion vanishes, and there is left only antiquated science.

By the last quarter of the 18th century science had reached a position where it no longer gave support to the tenets of rational religion. Laplace had proved mathematically, in his *Celestial Mechanics,* what the wisest of Newton's contemporaries had already suspected, that the irregularities in the solar system are cyclical, and correct themselves in time. The world was in very truth a perpetual motion machine that needed no guiding hand. It is told of the French astronomer that when Napoleon, to whom he had been explaining his discoveries, asked him where God fitted into his system, he drew himself up proudly and replied, "Sire, I have no need of that hypothesis." Convinced materialists like Diderot and Holbach pointed out, with a logic that seemed irrefutable, that the notion of a Creator, whatever religious value it might possess, certainly contributed nothing to scientific explanation. Better, said Holbach, to explain the world we observe in terms of the matter and motion we can investigate

than to take refuge in a deity of whom we can learn nothing. More skeptical and agnostic thinkers like Hume and Kant, in closer touch with the increasingly empirical trend of natural science, cast grave doubts on the validity of presupposing any perfection in the cause of the world we actually experience. By subtle reasoning they sought to reduce the necessary assumptions of Newtonian science to a bare minimum. Rational religion turned out in their hands to be not rational at all, but a venture of faith. There were even those, like Buffon and Lamarck, who suggested the evolutionary hypothesis to account for the adaptations of living organisms, long the stronghold of those who maintained the world had been created by conscious design.

No wonder men felt that little was to be gained by identifying Christianity and science. Those for whom it still had some meaning realized that religion could not be science or philosophy, could not be a mere club to enforce a narrow moral code. If it possessed any reality at all, it must be a life, and a complete life, as little rational or narrowly useful as life itself. The net result of a century of compromise was the widespread conviction that it was impossible to harmonize the religious tradition with Newtonian science by making religion a branch of science. If the religious tradition was to be preserved at all,—and there were many in anti-clerical France, where the whole of Christianity was hated because of the Church's identification with the old régime, who were quite prepared to abandon it entirely,—there were two alternatives. Either reject science and the scientific spirit, and frankly revive faith; this was the choice of the German Pietists, the

English evangelicals, and the Catholics. Or else make science itself religious, found it on a religious world-view; this was the choice of the great Romantic philosophers, the German idealists.

The failure of the 18th century attempt to adjust the artistic and religious tradition to the new forces of science and commerce proved to be the immediate cause of a great wave of reaction that swept Western civilization at the beginning of the last century. Beginning in a series of religious revivals and in a strong impulse to artistic creation, this Romantic protest against the narrow scientific and commercial ideals of the Enlightenment eventually made itself felt even in political and economic life. The pull of tradition was too great for a small educated class so easily to discard it. The 18th century compromise was too meager, it failed to include too much that was part of the very body of Western civilization. Science retreated into the laboratory, even the business men had to struggle to retain their gains. The new forces were not permanently driven back, but men turned for a time to different interests before making another attempt to assimilate them.

In many ways the Romantic movement is a seeming break in the process of cultural change. In the 18th century there appeared every prospect that the scientific and commercial spirit would triumph completely, that the past had already been left behind. Certainly the course of the next hundred years would have been far less complicated had the coming of the machine and the eventual triumph of science developed naturally out of the Enlightenment. Romanticism introduced a host of disturbing elements and conflicts.

Though its influence is waning to-day, it is still as strong as science. Indeed, the fierce passions of nationalism, the greatest social manifestation of the Romantic movement, are unquestionably the most powerful forces in present-day society.

It is difficult to describe this great cultural movement. The very fact that it was primarily a protest, and a protest against rationalism in the name of all the irrational elements of life, makes it all the harder to judge its ultimate effects on our civilization. So manifold and contradictory were its varied manifestations that it is almost impossible to avoid singling out certain things to the exclusion of others just as important. It is undoubtedly true that for most men it meant a rejection of the 18th century spirit, and a conservative, even reactionary turning to more traditional interests. It enlisted the support of all those who clung desperately to the past, of the landed interests, of religious men, of artists. And yet we can see to-day that this traditionalism is far from being the whole story. It was an appeal from the narrow and dogmatic systems of 18th century society and thought, not only to the riches of the past, but to the wealth of a broader human experience. It was really a second great attempt to assimilate all the forces of the modern world, this time drawing on a far wider body of material than had the first. It was another venture at mediation, at modernism, and it proved far more successful than the compromise of the Age of Reason.

Though it was primarily an attempt to escape a narrow science, science itself was ultimately extended, enriched, and humanized by the penetrating criticism it received. The chief scientific movements of the last

hundred years owe their very inception to the Romantic spirit. The experimental attitude, the willingness to rest on a multiplicity of facts rather than on a neat logical system, to submit every law, every generalization to the constant test of experience, is of the very essence of the Romantic spirit. When William James said that, though all crows have been uniformly found to be black, he was still looking for a white crow, he was not only expressing the very soul of modern scientific investigation. He was stating the Romantic ideal. The Romanticists were pioneers in opening the less mathematical fields as valid realms for scientific knowledge. Biology and psychology, the source of so many of our contemporary scientific concepts and methods, were possible only after the exclusive hold of mechanics had been loosened. History, growth, development, the whole new dimension of time that meant nothing to Newtonian physics and that has today transformed it, came into their own with the Romanticists. The very notion of evolution itself made its way into scientific thought, not from biologists, who clung to special creation, but from the Romantic historians. For better or worse evolution has remained to this day largely a Romantic concept. It has been a long struggle to purify it, to make it an exact and scientific notion; in the popular mind the process has not yet been completed. The watchword of the chief living Romantic philosopher, "We cannot sacrifice experience to the requirements of any system," might well stand as the motto both of the Romantic movement and of modern science.

Indeed, even the best that the Age of Reason achieved was sadly in need of broader imagination

and deeper insight. The great ideals of toleration, benevolence, humanitarianism, cosmopolitanism, peace, and progress, stand out against our 19th century nationalisms and wars and social struggles. Yet they too were vitiated by a narrow mechanical uniformity, a rigidity and inflexibility. The men of the Enlightenment after all tolerated only what they were not interested in, religious faith. Benevolence and humanitarianism sent thousands of individual men to the guillotine in the name of the Rights of Man. Cosmopolitanism proved helpless before the wave of nationalistic hatreds; it provided no real guidance for international relations. Peace remained an ideal only so long as there were no markets and raw materials to fight about. Progress led to the horrors of the early industrial revolution and the dull degradation of Glasgow and Manchester. Eighteenth century liberty had no sense of coöperation, of unity in the midst of diversity, of the functioning of an integrated society. To all these defects of Romanticists were keenly alive. Though they may have given no adequate solutions, they saw clearly the many elements that the optimistic rationalist had overlooked.

The Romantic protest was felt earliest in religion, for the failure of the 18th century compromise became there apparent first of all. It was easiest to reject the scientific spirit *in toto,* especially for the masses who had never deeply felt its appeal. In Germany, in England, and in America a series of great religious revivals emphasized just those aspects of the Christian tradition that had disappeared from the rational religion of the Enlightenment. The Pietists in Germany, the evangelicals in England, the Methodists who left the

English Church as well as the Low Church group who remained within it, turned to a warmly emotional religion of personal salvation. It was among the new industrial class in the North of England, and in the frontier communities of America, that evangelicalism first took root. From 1800 onward the new West was won by earnest and fearless evangelists. Calvinism was too intellectual for the pioneer. Even in its New England stronghold it had been for a century slowly disintegrating under the impact of Enlightenment rationalism. The time was ripe for a faith of wider popular appeal.

Present-day Protestant orthodoxy or fundamentalism is the direct descendant of this 18th century religious revolution. The old-time religion is thus not so old after all. Where the Reformers and the Puritans had turned to Augustine for their inspiration, the evangelicals turned rather to Paul. Augustine was a philosopher, and had embodied in his formulation of Christian theology much of the intellectual speculation of Greek thought. Paul was no philosopher, hardly interested in the things of the mind. Where Calvinism and the Puritan tradition had been theologically-minded and intellectual, emphasizing God and a great system of the world, the evangelical movement and its fundamentalist heirs have concentrated rather on man and the intense emotional crises of his life. They have appealed to human experience against the optimistic and facile rationalism of the 18th century, to the personal experiences of sin, of religious conversion, of redemption by the living Christ,—in a word, to the sterner realities of the moral life. They have found the core of the Christian tradition in the mystical faith of

Paul, in so-called "Bible Christianity,"—that is, in the Christian tradition minus its thought, its philosophy, its worldly wisdom gathered over long centuries. Such a faith made a powerful appeal to the pioneers of the new world and to the despairing victims of the early industrial revolution. It still flourishes in those regions little touched by the intellectual interests of the modern city.

In this turning to emotional experience the evangelicals were undoubtedly right. The religious life is surely vastly deeper than the thin Unitarianism that is our heritage from the age of natural religion. It is something rich, deep, and vital. But the particular experiences to which they turned were narrow, bordering often on the pathological. In the revival meetings which were the characteristic form of evangelicalism religious feeling easily passed into an emotional and sexual debauch. On the whole the Catholic revival which followed a little later was much sounder in its appeal to the full wealth of the Christian tradition. Both the Roman Catholics on the continent and the Anglo-Catholics of the Oxford movement in the thirties and forties sought inspiration in the mediæval age of faith, and found there much of enduring value. They too emphasized the non-intellectual elements, the art and ritual, the mystery of the sacraments. Despite temporary returns of strength, Protestant evangelicalism seems gradually to be giving way to other religious tendencies. The Catholic movement is the only permanent and growing religious heritage of the Romantic revolt.

These mass movements appeared first in the lower classes of society, and only gradually penetrated into

the ranks of the educated. The enlightened middle class could not blandly disregard the science for which they had displayed such enthusiasm. Before they could respond to the wave of religious feeling they needed a philosophy that would give a rational justification of the faith they desired to hold. Such new philosophies appeared in Germany, which had every reason to oppose the Enlightenment culture dominated by France. There were two ways in which faith and reason could be reconciled. The first, and easier, was that promulgated by Kant in 1781 in his *Kritik of Pure Reason.* He sought, by criticising the methods of science, to show its limitations, and leave room beyond it for faith. There were thus for Kant two separate realms of science and religion, existing side by side. The second and harder path of reconciliation was to work out a new synthesis of science and religion that should include the values of both reason and faith. This was the task of the German idealists, and of Hegel in particular. Kant's expedient of accepting both the Protestant rational theology and the mechanical science of Newton unchanged, and carefully placing them in separate realms where neither could intrude upon the other, was but a subtle rationalization of the first reaction of the average man, who keeps new ideas side by side in his mind with old. Such watertight compartments, however, are bound to break down in time. In the next generation both science and religion were subjected to a thoroughgoing reconstruction at the hands of Hegel, who thus stood in the great tradition of Augustine, Thomas, and Spinoza. Unfortunately for the idealistic synthesis, science would not stay put. Hegel's attempt at mediation, imposing

and revolutionary as it was, was premature. Nor have any of his many successors since been able to create a compromise flexible enough to keep pace with scientific advance. Yet it is clear that it is to Hegel's method of drastic transformation of both science and the religious tradition that men in search of any ultimate mediation must turn.

The net result of these Romantic philosophies was to rehabilitate a religious and non-scientific world-view. They were welcomed by poets, artists, religious men, prophets in full revolt against the inadequacy of the narrow scientific ideal of the Newtonian age. Science dealt with a world of mere appearance; its laws were both abstractions from experience and distortions of experience. Reality was to be reached by other means than scientific reason: by traditional faith, by moral insight, by artistic imagination, In its place mechanics was well enough; but let no man of feeling or talent be bound within its narrow limits. There were a multitude of things in the real world that slipped from the grasp of the physicist; and to their exploration men eagerly turned once more.

Thus Romanticism found expression in the two characteristic religious movements of the last century. On the one hand, there were the great revivals of traditional faith, sweeping across Europe and America to destroy the religious indifference of the preceding century. On the other, there were serious new attempts at modernism and mediation, at incorporating in a reconstructed religious tradition a far richer mass of values than the simple natural theology of the Enlightenment had included. Both contemporary orthodoxy and modernism or liberalism owe their

strength and their intellectual formulations to the Romanticists.

While these rebirths of religious faith were taking place, the artists were making their own escape from the trammels of the pseudo-classical ideal. They turned, with many an English poet from Thompson to Keats, to expressing the changing moods of nature. They sought, with Goethe, Shelley, de Musset, or Hugo, the passionate portrayal of lyrical feeling. With the novelist, with Wordsworth, they tried to depict the full stature of the natural man. They followed Scott and his many imitators in escaping into an unreal world of mediæval romance. They turned to pure fancy and the play of the imagination, and produced the beautiful but vague dreams of a Coleridge or a Shelley. Gone were the rules of the critics; order and precision gave way to the wildest profusion of extravagant form.

Many of the productions of the Romantic artists rank with the very best our civilization has achieved. It was the great age of lyric poetry and of music. To this day no artist can approach his materials without feeling the profound influence of that creative outburst. Yet the very fact that Romantic art was an art of protest, an attempt to escape from the workaday world into a richer realm of the imagination, has served to divorce art from the living currents of social life. Except where it felt deeply the new forces of nationalistic sentiment, Romantic art failed to express the life from which it sought to escape. It was the creation of an isolated group of artists, not the natural flowering of a society. This divorce of imagination from life has continued to dominate the artist, and was

never more keenly felt than to-day. It has made all the more difficult the artist's assimilation of the rich materials of our modern industrial and scientific society, and has contributed greatly to the artistic impoverishment of our daily life.

It was not only the religious man and the artist who rebelled at the meagerness of the 18th century compromise. The French Revolution provoked a natural reaction against the social ideals of which it was the embodiment. Everywhere the landed interests made a desperate resistance against triumphant business enterprise. Some in blind conservatism, others with a genuine appreciation of the values of the old régime, sought to preserve much of the older social institutions. In England the genius of the British constitution and the virtues of prescriptive rights were extolled in magnificent prose by Edmund Burke. There was a new wave of mercantilism in the interests of the landlords, culminating in the corn-laws. There was a wave of panic-stricken return to arbitrary strong government as the English countryside was threatened with an agricultural revolution, and the factory operatives grew restive. In France business men themselves, frightened by the specter of democracy and jacobinism, gladly turned to the strong man on horse-back and the older political ideal of absolutism under the ægis of Napoleon. In Germany most of all, where the French invasion fanned an incipient nationalism into flame, men harked back to the traditions of the German past for a more adequate ideal than business prosperity. Most of the philosophers, from Hegel down, saw wisdom in some form of collectivism. German commerce was still a thin trickle lost in an agricultural society;

Germany needed the same common devotion and the same coöperation demanded in other lands at the time of the Renaissance. Out of political weakness sprang the deification of the German state. In the midst of such conditions were born the social ideals that ultimately welded Germany into a single nation, and gave her a conception of liberty as something more than mere laisser-faire. Whatever its nationalistic limitations, and their full harvest has since been reaped, this social philosophy of the state gave the Germans an attitude and a set of concepts that have enabled them to cope somewhat more successfully than other nations with the problems of an industrially integrated society.

Out of all these confused reactions from the simple ideas and institutions of the Enlightenment reconstruction of Western civilization, a few underlying principles emerge. In religion, in art, in political and economic life, men turned away from mechanical uniformity and system to experience in all its length and breadth and depth. They sought above all the familiar values of the past that had been crowded out by a too exclusive devotion to a narrow scientific and commercial way of life. To the great majority, the appeal to experience meant the appeal to tradition, to the past. The Romantic movement was in the main a great conservative reaction against the Enlightenment and the French Revolution, a reaction of agriculture against the business man, of the conservative business man against democracy, of the artist and the religiously orthodox against the scientific spirit. French traditionalists, Prussian patriots, English conservatives invoked the wisdom of the past against the petty theories of the Age of Reason. Yet to the leaders, the

great critics and thinkers keenly aware of the shortcomings of the Enlightenment compromise, the Romantic call back to experience meant something more than mere traditionalism. It meant that a successful grappling with the problems of social and cultural reconstruction, an enduring assimilation of the new forces of the modern world, must dig its foundations far deeper and broader than had the optimistic rationalists of the age of reason and commerce. A successful new synthesis must first explore all the values, both old and new. It must not lose itself in a premature and rigid system. It must be above all open-minded and receptive. This Romantic inclusiveness, this insistence on the assimilation of all the values, was the very essence of religion itself to the greatest religious genius of the whole movement, Schleiermacher. Though science has recovered its lost prestige, though business has with the aid of the machine reached a dominance undreamed of in the 18th century, men have not since lost sight of this fundamental lesson. Experience must be the final arbiter. In its light all systems and institutions must be criticised. No synthesis can be satisfying that does not embody the wisdom tried and tested by experience.

The Romanticists found in the experience to which they appealed certain values neglected in the Newtonian age. Human personality had been left out of the universal principles of mechanics. Men now emphasized not mere standardized reasonableness, but the individuality that is created by complex group life, and developed through active participation in social institutions. Men were no longer mere atoms, mere terms in an equation. Self-expression was as important as

the order of nature. The cultivation of personality was pursued in education, in literature, and in art. Despite all the pressure of mechanical environment, this cult of the self has persisted to the present. It brought with it reinterpretations of freedom as not mere independence, but as the conscious and intelligent acceptance of the conditions that enrich social life. While the Romantic ideal of freedom lent itself to the economic liberty so cherished during the last century, its recognition of necessary limits and conditions enabled it to meet the new industrial environment. Out of it has grown a conception of freedom as a conscious achievement to be reached by measures of social control, as something not incompatible with social legislation that restricts the arbitrary will of individuals in the interests of securing the necessary conditions of the development of a rich human personality. The intellectual justification of restricting laisser-faire when its fruits are destructive of human values has come largely from this idealistic inspiration.

Experience meant also to the Romanticists the long slow growth of human history and tradition. Mechanics might have no use for time, but in human life time is of fundamental importance. To understand any belief or institution it is necessary to trace its development. It is to men like Herder and Hegel that the 19th century owes its appreciation of the significance of development and evolution. Employed first as the key to human affairs, the notion of evolution was carried over into biology by the Romantic natural philosophers, there to work a profound transformation in science itself.

Finally, as against the atomic individualism of 18th

century life and thought, the Romantic movement was a return to the reality of group life. Man is by nature social, not an isolated individual. Human institutions are more than mere rational expedients to be lightly discarded when they seem no longer to be making for commercial progress. They are the matrix within which alone life can develop and function. Above all the nation is a living reality. The rationalist who claims the world as his country, who speaks of patriotic prejudices and thinks it silly to take off his hat to the flag, is blind to the forces that bind men together in a common enterprise. Cosmopolitanism is thin and anemic, compared with the richness of national feeling. In patriotic devotion to one's country, in its glorious heritage of past deeds and achievements, men find another world to live in. They are taken out of themselves and elevated into a nobler atmosphere; nay, rather they there for the first time find their true selves in selfless dedication to a coöperative enterprise.

There could be no gainsaying the fact that the cosmopolitans had missed something vital. The French Revolution spread a mighty wave of nationalism into the most remote corners of Europe, even into the endless plains of Russia. The thunders of nationalism have gone reverberating down through the century, overturning diplomatic settlements and uprooting ancient empires. They are now rolling through the stable civilizations of the Orient. Nationalism may be blind and irrational, it may lead to the lunacies of war and chauvinistic patriotism, but it is a part of human experience. In this most lasting heritage of the Romantic movement is revealed both its fundamental strength and weakness. It brought to the surface forces and cur-

rents that cut across the aims of science and business enterprise, and laughed to scorn the neat systems in which the Age of Reason tried to confine human life. Yet those very forces, being blind and irrational, lacking any clear guidance or direction, became the easy prey of the most aggressive and determined interests. The Romantic reaction provided the 19th century with an unsuspected mass of materials to work into its life. It overwhelmed the rationalistic compromise of the 18th century business men with a fullness of experience and a richness of living they had not begun to assimilate. Yet it brought no new synthesis. It failed to achieve any standards of the good life, of true experience, of significant art. The successful assimilation of the new forces to the values of the older tradition remained to be accomplished.

VIII

THE COMING OF THE MACHINE

The Enlightenment was the attempt to adjust the older civilization of Europe to the effects of the commercial revolution and of Newtonian science. The Romantic movement was a protest against too exclusive a preoccupation with business enterprise and the temper of mechanics, and an effort at a broader and richer synthesis. Neither wave of cultural readjustment was affected to any extent by the rapid changes that had taken place in science since Newton's day, or by the beginnings of industrialism and the factory system in England. Machine production was destined to transform the face of Western society far more profoundly than had commercialism; experimental physics, biology, and social science were about to introduce a scientific picture of the world far more revolutionary than the Newtonian order of nature, and far better able to pose as a satisfying alternative to traditional beliefs. Both these forces were gathering momentum at the very time the rationalists and Romanticists were struggling to reconstruct the earlier institutions and ideas. There is something ironic in the fact that even while the French Revolution and the religious and artistic revivals were creating a new set of institutions, forces were at work that were to relegate them to the past as completely as they themselves were discarding the old régime. Industrial organization was

to make laisser-faire, free competition, and the whole structure of the business man's social science the mere obstructive survivals of a bygone age. Evolution, electromagnetic energy, relativity, and experimental psychology were to make Newtonian mechanics and the scientific concepts and methods founded on it the curious relics of Europe's intellectual adolescence. When once the full effects of the machine and the experimental laboratory began to be felt, Western civilization was confronted with a problem of cultural readjustment that makes those earlier compromises with tradition seem half-hearted and childish.

The application of power to manufacturing is usually assigned to the middle of the 18th century. The impact of 19th century science on men's intellectual life is associated with 1859, the year of Darwin's *Origin of Species*. These dates are important to the historian, for they mark the beginnings of movements of momentous consequence. Yet we are sadly misled if we imagine that at those arbitrary times any great institutional or intellectual changes were consummated. Our civilization, in fact, did not begin to feel the impact of mass production, of the factory system, of a mature capitalistic economic organization, of a really mechanized and urbanized life, until the present generation. Most of those now living even in the more industrialized countries, like England, Germany, and the United States, grew up in the simpler society in which the characteristic institutions of Western civilization originated. Their habits of thought and their ways of life were formed in a world still largely rural, at most commercialized. They can never be true citizens of the machine age.

The science that was popularized in the great controversies associated with Darwin and 19th century physics, has not yet come to mould the thought of more than a tiny minority of men. The ideas of evolution, of mechanical determinism, of the ultimate extinction of human life on our planet, even for those whose beliefs were revolutionized by them, came rather as new Romantic philosophies than as the tentative hypotheses of a rapidly changing experimental science. They led men to view the world as a great sweep of universal progress, or as the scene of a cosmic despair. The full import of biological concepts, of the ideas of function and organization, of the central importance of time; the real significance of modern mathematics, of the notion of postulate systems, of functional correlation; the revolutionary bearings of the early 20th century reconstruction of the bases of physics and mechanics; the transforming consequences of the attitudes and concepts of critical anthropology, of experimental psychology;—hardly a handful of thinkers are alive to the further implications of these foundation-stones of the contemporary scientific spirit. Nineteenth century philosophy remained preoccupied with the problems set by the Romantic revolt against Newtonian science. At most it achieved a new language, a new terminology for the old solutions to earlier problems. It was so busy trying to find a place for human life and human interests somewhere within or alongside of the world science was describing, that it had no time to explore the intellectual and practical possibilities of that world. Even to-day there is hardly a thinker who has been able to do more than fit a few of the new scientific concepts into a system whose whole

architecture was determined by the issues of a century ago. One notes the paradoxes and contradictions in which Bertrand Russell finds himself involved when he tries to incorporate modern physics into a philosophy founded on the antiquated psychology of the 18th century. One meets the same almost insuperable difficulties in the more successful philosophy of science that Whitehead is working out. One watches with amazement the hold of the assumptions of Newtonian mechanics involved in the Kantian philosophy on even so informed and able a thinker as Cassirer. Apparently we have still to wait for an intellectual formulation that will start out from really contemporary scientific data and concepts.

We are, in fact, just beginning to realize some of the consequences that will follow when the industrial revolution has actually taken place, when the scientific spirit and temper of mind has made some genuine headway among the educated class. We are barely on the threshold of a really industrialized and mechanized life; we have not even commenced to think scientifically. Our times belong to the closing period of the old Christian, agricultural civilization. For hardly a generation we have been feeling the preliminary effects of the machine and the laboratory. That they will spread around the world, that nothing can stop their steady advance, seems as certain as anything within human ken. Already the old institutions are disappearing, the old verities are toppling. We can dimly peer into the future, to discern the vaguest outlines of what is in store for us. Prediction is impossible. Even to assay present tendencies with any assurance that we can distinguish what will grow and what subside, is a

hazardous undertaking. It was far easier for the man of the 14th century to foresee our own bustling civilization than for us to behold the new world that is coming to pass. The readjustments we must face, the transformation of what we have regarded as enduring and permanent, the persistence of what we imagine is already discarded as antiquated, surpass the insight of the wisest of us. We can only trace the story of the coming of the machine and the advance of science, and note the changes they have already effected in the whole range of our customs and beliefs.

Why a series of mechanical inventions, culminating in the successful harnessing of steam power, should have taken place just when and where it did, is one of the complex problems of history. For millennia highly developed civilizations had been content to satisfy their needs with hands and tools. At most draught animals had been employed to supplement human labor, or crude windmill pumps and water-driven gristmills. We can understand how in Hellenistic society or in ancient China human energy had been so cheap as to make the development of machinery useless. Now in the 18th century there occurred a series of novel inventions. It is doubtless too simple to say that they were called forth by economic need. Nevertheless, it is certain that they would not have taken place had not the expansion of European commercial life provided a strong incentive for increased production. On the one hand, the market was greatly enlarged; on the other, business prosperity had piled up a surplus of capital that eagerly sought more profitable channels of investment.

The story of the 18th century revolution in methods of manufacture rightly centers about the textile trade.

Other inventions, notably those in transportation, may have had ultimately more far-reaching consequences; but the textile industry was the major branch of manufacturing. The inventions here moved back and forth between the spinning and weaving machinery. Improvements in the loom called for a greater supply of thread than hand-spinning could afford; mechanical spinners demanded a still more efficient loom. With the ability to make textiles on a large scale, there was a call for a new supply of a cheap raw material; and in its turn the cotton gin made cotton goods possible. A careful study of the progress of invention reveals not so much happy chance as the definite search by a large number of men for improved methods. Each new invention, speeding up one part of the process, called for complementary inventions elsewhere. It is a great mistake to attribute any single mechanism to the genius of one man. Into the modern Jacquard loom there have entered literally thousands of separate inventions. The curious reader, for example, is often perplexed to find that one set of inventors receives honor in England, another in America, a third in Germany, and a fourth in France. The explanation is that common industrial problems were solved in all these countries about the same time. The prizes went, not to the inventor, but to the successful commercial exploiter.

The early steam-engine was developed for pumping water out of mines. When spinning and weaving machinery demanded power, steam was naturally applied to supplement the streams. In the process the steam-engine was given a flexibility that suggested a hundred other uses. Its adaptation to land and marine

transportation, to printing presses, to the heavy work of iron-founding, was only a question of time and ingenuity.

The part in the story of invention played by the new mechanical science is complex. From the days of Galileo onward, the physicist received as much stimulus from practical devices as he gave. The great scientific discoverers have not commonly applied the principles they first formulated. Practical men, especially in England and America, constructed the ingenious machines. Theoretical scientists have extended and generalized the principles involved. The steam-engine gave a strong urge to the study of problems of heat and energy. The early 19th century generalization of the conservation of energy was carried out in the very shadow of the nearby factory. On the other hand, practically every electrical device was at first a toy of the laboratory, from the telegraph to the dynamo. One thing at least is certain, that pure and applied science have from their very beginnings advanced hand in hand. Our natural science is in very truth what Bacon and Descartes and all its early prophets proclaimed it, the type of knowledge natural to a society bent on mastering nature by mechanical means.

One conditioning element in the rise of the machine is commonly overlooked. Power production could advance no faster than the machine-tool, the instrument for making other machines. From the first turret lathe to the high specialized roomfuls of machinery in the modern automobile factory designed to turn out rapidly and efficiently a single piece of metal, the metal-working machines have been the fathers of all the

others. Industrial primacy has hitherto gone to those nations that have developed and controlled the machine-tool. Though a country have as large a textile industry as, for instance, pre-war Russia, it can not claim industrial maturity until it produces its own machines. With the machine-tool go the processes for smelting the raw ore into finished metal, and the many complicated methods of making iron into tool steel. Electric power calls for the handling of copper, and the devising of efficient means of insulation. Each new invention making possible the more efficient handling of metal has multiplied a thousandfold the opportunities for further mechanical operations.

When once a civilization has accumulated the mechanical techniques that ours has, it seems to take only a sufficiently strong demand to call forth any conceivable needed invention. In the industrial countries invention has ceased to be an individual matter, and has entered into the group mores. Only in the case of radically new sources of power, like electricity and the gas-engine, or new devices like the automobile and the airplane, is there still room for personal distinction. In such cases the very success of established methods usually militates against a too ready acceptance of novelties. Air transportation has undoubtedly been kept back by the efficiency of the automobile and the express train.

The social progress of invention is thus as much a function of economic demand as of scientific knowledge. The laboratory is always far ahead of the factory. What machine will prove practicable ultimately reduces to some slight economic differential. Soft coal, for example, has hitherto been so cheap that the in-

dustry is a byword for inefficiency and antiquated methods. The great majority of coal mines still use the equipment of the early industrial revolution. Gasoline, on the other hand, is neither cheap nor plentiful; and consequently the refineries have developed highly efficient and elaborate processes. Agriculture has particularly suffered from lack of invention. Its products have been so abundant, and its labor-supply so overcrowded, that outside of parts of America it has made little use of the technical skill of our civilization.

If the process of invention is dependent on a complex balance of social factors, it has in turn a profound and unforeseen influence on the society in which it occurs. Every schoolboy now knows that the industrial revolution which began in 18th century England has been the most important event of modern times. It comes as a shock to learn that the very phrase "industrial revolution" is no older than 1889. We realize that machine production has altered the very texture of our lives; yet for a hundred years men gave scarcely a thought to the new force insinuating itself into all their habits. They were aware, of course, of mechanical invention; but it never occurred to them that they were witnessing a major cultural transformation. Most of us, in fact, still imagine we can go on thinking and living much as our ancestors did.

Industry was born of the city and the market-place; it has made the city supreme. A hundred years ago the city dweller was the rare exception; to-day he is the rule, not only in Western Europe, but even in agricultural America. Eighty per cent of the people of England are now living in towns and cities; in Belgium the proportion is even higher. The population of Europe

increased fourfold in a hundred years; England grew from eight to forty million inhabitants. This new mass of human beings went into the city; the countryside barely held its own, and in many places, like England, its population actually declined. The sheer bulk of these new urban centers is amazing. The commercial towns of the Middle Ages rarely held more than thirty or forty thousand souls; only a few capitals, like Paris and London, were over the half million mark. To-day such a figure hardly constitutes a respectable suburb. There are in Europe 185 cities over a hundred thousand; in Great Britain, 45, in Germany 46, in the United States 81. The rapidity with which these human masses grew was unprecedented. In the fifty years before 1830 Glasgow increased from thirty to three hundred thousand. The German industrial centers after 1870, to say nothing of American cities, show an equally surprising record. Such huddling had never been known before. It is no wonder that city fathers could do nothing in the face of such swarms, that housing conditions were terrible, that governmental structure broke down completely. The popular cry of "Hands off!" was a rationalization of the sheer inability to cope with the novel problems of the great society.

The first factories were located by the banks of streams, usually in sparsely settled regions. When steam came in, it was applied to existing machines. Dirty rivers were left to glide idly by New England mill-towns. Industry continued to grow where it had first secured a foothold, where a labor supply and facilities for secondary processes were located. Existing towns bred others. There was a slow shift nearer

the supply of raw materials, like the shift that is to-day taking industry out of New England. Where many conditions united to favor rapid growth, the whole countryside was urbanized. There are parts of Lancashire, regions like the Ruhr valley and Pittsburgh, where one rides for miles through one great sprawling factory town. The distributing centers grew up at strategic points, sometimes around ancient cities, like London, sometimes about villages like Berlin and Munich. The factory towns never grew quite as large as the commercial cities; London, New York, Berlin, Vienna, retained their lead. The railroad, especially in America, built its Chicago's and St. Louis's and Kansas Cities. Ports like Liverpool and Hamburg and Antwerp and Rotterdam made still another class of human beehive. Movements of population took place that put all previous migrations to shame. The center of density in Great Britain shifted to the north, formerly a barren region. Central Scotland, Lancashire and Yorkshire, filled to overflowing. Belgium, Saxony, Silesia, and the lower Rhine valley swarmed with men. In comparison the rich agricultural areas seemed thinly peopled. The West of England, so important during the Middle Ages, was left outside the main current. France, which escaped rapid industrialization, and remained a land of small farms and market-towns, grew hardly at all. At Napoleon's time France had overshadowed the rest of Europe. Her population was much greater than that of Germany, three times as large as England's. Frenchmen have not yet grown used to the position of a secondary power. In the 18th century there were almost as many people in Ireland as in England; to-day there are only one-tenth as

many. We can hardly realize that in the 17th century the Dutch could be serious rivals of a not much larger group of Englishmen.

These great mass movements, these shifts in the sheer bulk of mankind, were all to the disadvantage of the rural areas. The opening up of large regions of land in America and elsewhere hastened the rapidly declining importance of agriculture in Europe. In the cities was concentrated a power out of all proportion to their population. Industrial capital increased by leaps and bounds. Business men and bankers no longer needed to fear the landed interests. They controlled credit and markets, and had the farmers at their mercy. Whatever party was in power, they were the voice behind the throne. The periodic revolts of the farmers in times of depression failed to shake their intrenched position. They directed foreign policy without a protest. Even in America, with the crushing of the only organized body of agriculturalists, the Southern planters, in the Civil War, political power passed almost completely into the hands of business men.

The cities were not only supreme economically and politically; they triumphed in their mores and customs as well. The farmer became a "rube" and a "hick." His ways were queer and old-fashioned. The factory worker felt immeasurably superior to him. The educated class lived in the city; the scientist, the artist, the writer, those who consciously set the standards, visited the countryside only on their vacations. The farmer could not afford the education that was available to the city-dweller; if his sons enjoyed it, they could not bear to return to the farm. The country was drained of its most enterprising inhabitants; the

city spelt opportunity, riches, fame. All that was alert and progressive in Western civilization flocked to the city, there to suffer the impact of urban environment. From the city, too, came the inventions that transformed the countryside into as close an imitation of the city as possible. The farmer's papers and magazines were printed in the city; his movies were made by city actors; his radio programs were broadcast from the city; the clothes he wore, often the very food set on his table came from the city and followed the city styles. The civilization of the rural regions to-day has lost most of its distinctive character; it is rapidly becoming as urbanized as that of the town itself. So eagerly do the farmers and the small town ape the city that it is becoming meaningless to speak of any conflict between them. Even on economic issues the farmer thinks like a business man, if elections are any gauge; what conflict exists is that between different industries. Only in a few deeply ingrained customs is there much divergence: the countryside is still more attached to traditional religion, it is more devoted to prohibition. It is doubtful how much longer even such differences will persist.

The great bulk of the city dwellers fell into two new social classes. In the factory towns, they tended the machine. In the commercial centers there was in addition a great army of shopkeepers, clerks, and office-workers. The business men and the skilled craftsmen were a small minority. Yet up to the present, especially in America, the business man has largely determined the attitudes and customs of this urban proletariat. There has been just enough chance for any man to rise high up on the economic ladder for both

white collar and overall worker to rest content with the prizes and the system that makes them possible. Outside of the periods of depression and unemployment, the only complaint of the worker has been that he has not yet risen above his fellows. So long as prosperity lasts there is little chance for a distinctive proletarian attitude or culture to develop. In Europe, where class lines have been more strictly drawn, the urban industrial proletariat has been more interested in its position as a class. But even in England and Germany, where there is some real psychological difference between a bourgeois and a proletarian class, no working class movement, either political or economic, has been able seriously to challenge the supremacy of business enterprise. Despite the new economic cleavages which industrialism has introduced, the striking change, as compared with earlier societies, is the almost complete dominance of one uniform culture, one uniform set of attitudes and beliefs and ideals and standards. Rich and poor read the same papers, see the same movies, wear the same styles, and share the universal desire for the wealth and prosperity and luxuries of the machine age. Rich and poor crave the same amusements, thrill to the same sports, and feel the same irrelevance in older standards and beliefs.

Naturally so powerful a force as the machine demanded a new form of control. Government played little part in the organization of human life that grew up about the factory. Business men had just successfully waged a long battle to keep political control out of their preserves. The control that arose was wholly in their own hands. The early factories were usually established by individuals who borrowed the necessary

capital and organized the business themselves. The typical figure of the first stages of industrial organization has passed into economic fiction as the entrepreneur. It was his versatile task to combine in his person functions now distributed among a large personnel. He was owner of the plant, securer of credit, superintendent, and sales-manager all in one. In one sense he was able to see his factory functioning as a unit far better than the narrow specialists of the present régime. But there was little opportunity to think in terms of his industry as a whole. Mills were isolated, in bitter competition with each other, for a largely local market. The very push and domineering initiative which the early captains of industry needed to succeed centered their attention on their own activities. It tended to strengthen an already powerful sense of personal proprietorship. Such men in very truth had built up their business themselves. They found it natural to look about them in a proud possessiveness. "I can do what I like with my own!" was their motto. They were pioneers, as truly as the frontiersman; they shared the pioneer's love of independence, his hatred of any interference, his versatility, his inventive adaptability. It was no accident that the second generation of American settlers in the Middle West took so naturally to industry. Those early builders shared the virtues and the defects of their fathers.

At first there could hardly be said to be any organization of industry. Each mill-owner was an autocrat within his own limited domain; but only the ties of unscrupulous competition bound him to his fellows. The situation was roughly parallel to the chaotic anarchy of mediæval society, when each petty baron

bowed only to superior force. As industry grew, however, it was the golden lines of credit that forced a greater integration. New enterprises needed funds; successful ventures were amassing a rapidly increasing surplus of capital. Under the circumstances the swift growth of the corporate form of organization was inevitable. To sell shares was an unfailing source of credit, as well as highly profitable to the organizer. The shrewder business men perceived the increased power and gain that came from combining small businesses into larger units. The era of such combination started in England in the forties and fifties, in America in the eighties and nineties. The bringing of many factories under a unified control possessed many social advantages. Especially in trades where competition had flooded the country with a superfluity of rival plants, there was much to be gained from the economy of large-scale operations, from the abolition of cut-throat and unscrupulous sales competition, from the possibility of more efficient techniques. Industry certainly demanded more unified control. But unfortunately when combination came, it was carried through solely in the interests of the financial manipulator. A corporation embracing several smaller plants could commonly count on a larger income than the small factories put together. To capitalize this increased earning-capacity the organizer took for himself a large block of stock, to which he made sure that financial control belonged. When the stock was placed on the market, it became the prey of speculation and gambling; and the great profits accruing from such manipulation often quite overbalanced what might be made from honest manufacturing. This was the era

of the romantic buccaneers of finance, the dominating personalities like Jim Fiske and Jay Gould and Vanderbilt and Carnegie and the other founders of our industrial dynasties. They achieved a certain measure of industrial organization; but while the unified direction thus afforded provided channels through which great technical advances could be made, as often as not it was employed to wreck smaller competitors and establish monopoly prices. With hardly an exception the new corporations were so heavily watered, they were saddled with so large an interest to be earned, that the consumer rarely felt the material economies made possible by combination.

Such spectacular schemes still persist, especially in periods of disturbance like the war, and in new industries like oil and the automobile. But in the older trades more of the effects of unified control are apparent. The floating of stock and bond issues was naturally the function of the banking houses. More and more the large bankers ceased to be mere purveyors of money, and were transformed into the real executives of industry. The houses specializing in such industrial financing, the investment-bankers of Leadenhall Street and Wall Street, found their control of credit gave them practical control of the entire industrial structure of the country. What industry should be fostered, what held back as too speculative, what general policies pursued, were questions that came to them for decision. Though not averse to profitable manipulation, their sway has meant on the whole a more stabilized government for industry than prevailed under the picturesque pirates of the last generation. Many natural monoplies, too, like the railways and the public

service industries, have finally forced a reluctant public to impose political regulation in the popular interest. At the same time the tremendous growth of advertising and sales-technique has turned the large corporations to mass-production at lower prices. Under such a régime the engineer has been able to devise ever more efficient machinery for economical production of immense quantities of goods. The worst wastes of competition have been eliminated, although modern distribution still entails a tremendous overhead. The earlier tendency to gigantic monopolistic corporations seems to have been checked by the sheer unwieldiness of such monsters; but effective control is achieved by other means, through employers' associations, above all through the investment banker. Outside a few anarchic industries, like soft coal, the garment trades, and the building trades, modern industry has passed out of the chaotic stage of free competition. The drive for a wider distribution has largely replaced the older competitive motive as the source of initiative and improved technique.

In the chief industrial countries the business structure has thus achieved a loosely unified control. That control is lodged in the hands of the bankers and large investors. It is hardly a responsible control; it is more correct to say that industry regulates the public bodies set up to watch over it than that they regulate it. It is almost entirely a financial, a credit control. It is in the interest, that is, of profits to the investor rather than of service to the consumer. It is not very flexible; the financing of new processes is still left largely in the hands of the speculator. There is little conscious envisaging of industry as performing definite functions

in the social community. Yet it is undoubtedly an advance on the older anarchy that still lingers on in disorganized trades. Out of industrial feudalism has developed industrial absolutism, tempered by oligarchy.

The capitalistic organization of the industrial machine that thus grew up had only the slightest connection with the recognized forms of political control. It was a powerful government, not so much invisible, for its workings were manifest enough, as irresponsible. Hardly a trace of the popular political democracy of the century penetrated the forms of industrial control. In only one field of governmental action did the business men deign to employ recognized political machinery, in the domain of foreign policy. There, however, their domination was complete. The foreign offices of the various European powers became from 1860 on practically branches of the great banking firms.

The economic revolution of the liberal merchants consummated by the beginning of the century had included free trade as one of its cardinal principles. Abolition of tariff restrictions on commercial intercourse was written into the new science of political economy as one of the immutable natural laws of wealth. So long as industry was located largely in England, English mill-owners were in accord with merchants as to the benefits of a free trade that would allow English goods free access to foreign markets, and at the same time keep down wages by the free admission of foreign food. Business men and manufacturers joined in the fight waged by Cobden and Bright during the thirties and forties against the corn-laws protecting agriculture. As late as the sixties Eng-

lish industry saw no virtue in tariffs. In other lands, however, infant industries trying to make headway against the flood of cheap English goods forgot all their hatred of political interference in business, and turned eagerly to governments for tariff protection. The United States led the way; American policy won the enthusiastic endorsement of Friedrich List, whose "national system of political economy" found great favor in Germany after 1870. By 1879 Germany was definitely committed to a high protective tariff; France followed in 1885. The Republican domination of American politics rested on the corner-stone of tariff protection. It is one of the paradoxes of the industrial revolution that while the official economic doctrines always invoked against governmental regulation were born of a revolt against tariffs and subsidies, it has developed everywhere but in England a full-fledged neo-mercantilistic system of tariff control.

By 1870 English industry was producing far more than the home market could absorb. In the next decade began the rapid annexation of new territories, mostly in the tropics. The earlier industrialists had been content, like Cobden, to forego political ties with the undeveloped regions in which they hoped to sell goods. British business was down until 1870 committed to a "Little England" policy. Now all was changed. Industrialism struck hands with the great Romantic heritage of nationalistic feeling. The result was the policy of industrial imperialism, as we have come to know it in the last two generations. France followed almost immediately, her great colonial expansion dating from 1881. German business men forced Bismarck to embark reluctantly on the same policy. The United

States was swept into the current at the Spanish-American War, and the smaller nations followed along behind. Foreign policy was devoted to the securing of closed preserves for business, and to checking the business success of other nationals. The rapidly growing armies and navies were soon placed at the disposal of every investor or merchant who desired help against his foreign business rivals.

In the new colonies and economic concessions all pretense at laisser-faire and free competition was abandoned. Prohibitive tariffs were placed, even in English colonies, against foreign goods. The nationals of the controlling power received every preference. The natives were governed in a more or less enlightned spirit of paternalism. Slavery in all but name was introduced to insure a labor supply in the tropics, especially the African possessions. Where Europeans did not actually control the government, as in Latin America, China, and the Congo, even worse conditions prevailed. Formal annexation proved often a real blessing.

The wild scramble that had by 1914 parceled out the whole world among the Western powers secured popular support by appealing to the powerful and blind force of nationalistic sentiment. But its guidance, through foreign and colonial offices, was in the hands of directly interested business men. The appeal was usually to the needs for foreign markets and raw materials, which even the Lancashire or Rhine valley factory operatives could welcome. But the major financial interests at stake were those of the investors seeking a high rate of interest guaranteed by the national army and navy. The European trade with all

the new tropical possessions put together was infinitesimal compared with the trade with other European states, or within these states themselves. Investors earned profits often ten times those of merchants. Often, in fact, Englishmen would invest in factories in India or China that competed directly with those of Lancashire. Yet patriotism demanded that the government bend all its efforts toward aiding this one small group of industrialists, at tremendous expense, and with the constant danger of ruinous war with national rivals.

Economic imperialism is the clearest example of the complete domination won by industry over political government. The state should serve business abroad by every means within its power. At home, however, it should resolutely refrain from any interference with the business man's economic government. In that government the great mass of workers had neither voice nor rights. The organization of industry took no account of the millions grouped around the machine and dependent upon it for their daily existence. In theory, the worker enjoyed absolute liberty. He was free to work where he wished, and under whatever conditions he agreed to accept. If he felt his wages too low or his hours too long, he was perfectly welcome to starve. He was to be a complete individualist, with no social ties whatever.

The machine was too much for all these fine-spun legal theories. Men gathered into the close association of factory work, even men deprived of all education and so held to their tasks that release drove them to debauchery, could not fail to respond to the new human grouping. At first in mere sporadic and unorgan-

ized outbreaks, provoked by a reduction in wages or a new speeding up, later in more determined efforts to improve their conditions, even factory workers were driven to strike. They rarely won the success which the skilled craftsmen achieved. But they gained a sense of solidarity and of power that led to serious efforts at more permanent organization. The labor movement that arose in self-defense against the complete disregard of the workers by the only industrial organization that flourished, that of the business man, has never fulfilled the high hopes of its more thoughtful leaders. It has never succeeded in supplementing the credit control of the industrial machine with a control of the human forces that operate it. It has been most powerful where it has most completely emulated the business man, and by establishing an effective control of the labor supply has been able to sell its skill at the dearest rate. What control it has come to exercise over industry has been largely negative. Countless practices obviously injurious and unfair it has been able to prevent. It has forced certain rudimentary rights of safety and health to be formally enacted into law by its lobbying. But even where fully developed collective bargaining has been finally accepted by the business executives, the labor organizations have rarely been able to determine positive policies of industrial government. The workers have been only too glad if they could set certain minimum standards of living below which their status must not drop, even in times of depression.

In most industrial countries the labor movement has directly or indirectly set a mass of limitations on the free action of the business executives of the machine. But it has not been able to advance beyond the estab-

lishment of these rudimentary constitutional rights in industrial government to any measure of self-direction or democracy. There are many reasons for its failure to develop a more satisfactory machinery of control. It has had to fight its way against a set of economic and legal habits formed in the revolution against all social or group control of business. In England the very right of organization was not fully gained till the seventies, in France not till 1884. American legal decisions with reference to picketing, boycotts, and organizing activities make the legality of organization still exceedingly doubtful. The long struggle against the employer has been anything but a school in the responsible administration of the power finally gained. The skilled craftsman has been naturally in the best bargaining position; and the advance of machine production has pushed him further into the background. The only effective power possible in the textile or steel industry, for example, has meant so extensive an organization that business has risen in alarm to repress it. Such a mass movement, in the absence of recognized channels for making demands effective, has seemed so revolutionary that political repression and public disapproval have usually greeted the attempt. The craft unions have rarely been able to forego their private gains to unite with the whole body of workers in a single industry. On such differences in bargaining power between the component groups most attempts at industrial organization have broken down.

Labor organization has been most successful in Germany. In England collective bargaining has been reluctantly accepted, but the machinery for genuine control is still to be forged. In America, save for

a few spectacular gains, the most recent of which occurred during the war, organized labor is still in the skilled handicraft stage. Almost without exception the basic industries where mass production has conquered have resisted all attempts at unionization. The steel industry, the automobile industry, the textile trades, are apparently hopeless. Of the really successful industrial unions, organized to meet factory rather than handicraft conditions, the brewers have given way to the bootlegger, the coal miners have practically lost control of the soft-coal field, the ladies' garment workers have been wrecked by factional disputes. The great mass of American factory workers have no means of protecting their most fundamental rights. They must trust to the benevolence and enlightened self-interest of an industrial autocracy.

Perhaps just because governmental authority was held to narrow limits, the machine was more successful in stimulating political self-government. In surveying 19th century history, nothing is more striking than the steady advance of democratic government in the wake of industrialism, and nothing more perplexing than its comparative ineffectiveness. The middle class had been content, for a short period after the close of the Napoleonic wars, to leave the state in the hands of a strong government led by the older landed interests. As their self-confidence increased, however, and they realized how completely they held economic control over the masses, they reached out to grasp government themselves. The business men triumphed in Great Britain in the Reform Bill of 1832. For the next twenty years they were occupied with sweeping away the remnants of the older agricultural rule. The

Corn-Laws went in 1845, and thereafter the Liberals, the industrial party, enjoyed the privilege of enacting their economic theories until 1874. Business won in France in 1830. It gained the franchise in Germany during the 1848 revolutions, and after 1879 dictated its measures. Government by and for the middle class won a complete success.

In the political excitement that prevailed before 1848, the democratic theories put forward by the extremists during the great Revolution of 1793 won wider acceptance. Even the conservatives realized that universal suffrage was bound to come. Between 1820 and 1830, under Jackson, American frontiersmen joined with city workers to secure the extension of the franchise. French peasants definitely won the vote in 1848. It was in the same year, 1867, that the working class in both England and Germany won the right to elect legislative representatives. The other countries of Europe followed during the century, until finally, in the wave of revolutions that swept central Europe in 1918, universal suffrage was embodied in practically every constitution.

This granting of political power to the industrial proletariat, as the conservative statesmen like Disraeli and Bismarck who bestowed it predicted, has had surprisingly little effect in modifying the dominance of the business class. The presence of an emotional and politically untrained electorate fostered the growth of our present party government, so admirably fitted to secure the demands of the compact and highly organized business minorities. It greatly increased the strength of nationalism; the appeal to patriotism and hatred of the foreigner in one campaign after another

has proved an unfailing pathway to power. It made it easy to build up well-oiled party machines whose votes could be counted on to support the existing economic régime. But those regions that have enjoyed political democracy longest, like America and France, have lagged furthest behind in enacting legislation for the benefit of the laboring class. Paternalistic Germany, where universal suffrage was coupled with a strong bureaucratic government, went far beyond the more democratic nations in its far-seeing program of social insurance and factory legislation.

The simple fact remains that no adequate democratic machinery, even in political government, has yet been devised for a highly industrialized state. Democracy has succeeded best in the simpler agricultural communities, like Canada, New Zealand, Australia, some of the Western states of the American union, and smalling farming nations like Switzerland, Norway, and Denmark. Confronted by industrial conditions, the issues have been so complex, and the entrenched power of the business men so strong, that democratic machinery has become largely a complicated method for giving the masses bread and circuses.

In some ways, however, democracy has helped industrial societies to satisfy their social needs. It has given the masses educational opportunities they never had before. The first fruit of Jacksonian democracy was the establishment of universal free education, reaching up through the state universities and technical schools. In England the Reform Bill of 1867 was followed in 1871 by the first serious attempt to provide education for the English working class. On the continent popular education has been even more closely

associated with "training for citizenship" and patriotism. The public school, together with military conscription, has been the chief instrument in fostering the rising tides of nationalism.

Such cheap mass education has furnished the literacy indispensable for an industrial proletariat. It has taught the clerical skill required by the mass of office-workers. In places, notably in Germany, it has given training in craftsmanship. But for the most part, especially in America and England, it has tried to give to every child a diluted form of the traditional classical and literary education of the upper and middle classes. The smattering of elementary science and modern languages introduced in the last generation made no lasting impression on its victims. Of real acquaintance with the world in which his life was to be led the child gained practically nothing. History instilled the proper loyalty to his country and her enterprises; what social science he absorbed taught undeviating devotion to the existing order. Secondary education was even more traditional and cut off from the actual life. The American policy of throwing open higher education to all comers has been one of the most momentous incidents of democracy. On the one hand, it has certainly given a college training to an unprecedented horde of students. But the lack of distinctions and grades in such training has diluted the whole mass, and held back the gifted few; while the presence in the colleges of such numbers has either discouraged intellectual pursuits, or else made them narrowly and personally utilitarian. One of the touching effects of our industrial world is the overweening confidence it has engendered in "education." It is "education" that will

raise a man above his fellows; college is worth while in hard dollars and cents.

Many earnest efforts have been made during the last generation for a more realistic and liberating education. Conditions have changed for the better, especially in the lower schools, to which modern educational theory has been most devoted. But for the masses an irrelevant schooling has been succeeded by the mass-education of the yellow press, the tabloids, the movies, and the radio. All these institutions for adult education have been graded down to the lowest intellectual level, in order to make the widest appeal. They are rapidly moulding modern urban populations into one uniform and indistinguishable mediocrity.

The extension of formal schooling to the masses which has followed in the wake of industrialism is but the most imposing of the fruits of democratic control. Slowly but surely governments have taken on more and more regulatory functions. Doctrinaire political economy, even when supported by the weight of the business interests, has been unable to withstand the pressure of factory and urban conditions. One after another set of protections has been thrown about the worker. Factory legislation, more or less inadequately enforced, has grown to fill whole libraries since the first act in 1833. Women and children have been granted special safeguards. In the modern city even individualistic Americans have been forced to submit to inspections, regulations, and prohibitions that would have horrified a 19th century liberal. Modern municipal governments have far more power over their citizens than the most collectivistic of mediæval guilds and communes. Science has made it possible to set

standards of health and food; urban crowding and the sheer helplessness of the individual has made it necessary to enforce them. We submit to-day to the regulation of the most intimate details of our life, because we are so huddled that we need protection against the very ignorance of our fellows.

Yet in spite of the growth of social legislation, and the recognition that freedom has its necessary conditions that must be socially enforced, the great restrictions on arbitrary liberty of the individual have not come from political action. They have grown up in the very structure of industrialism itself. There can be no freedom to do as one wants in a factory. The use of machinery entails the acceptance of its own conditions. One cannot drive a car without constant regard for the movements and rights of others. Traffic regulation is typical of the manner in which human life has been socialized. The routines followed by the ordinary man are set by the tempo of the machine he serves. He must catch such and such a train, in order to be at work at the prescribed hour. He must adapt himself to the work of others, in an office or a factory. His very pleasures are determined by the hour of broadcasting and the date of Hollywood releases. His care and forethought for the future have been socialized in our mammoth insurance schemes. He grows so accustomed to being dragooned by the insistent demands of his complex social life that he accepts any command, of high-pressure salesman or political propagandist, with little struggle. Even when he engages in mass-rebellion, as against prohibition, he follows the crowd without question. If the city dweller has escaped some of the pressure of tradition that weighed on the

farmer, he has exchanged it only for the stronger pressure of the passing fads and enthusiasms of his contemporaries.

The upshot has been that though the functions of the individuals have been differentiated into a kaleidoscopic variety, and the simple and monotonous life of the farmer has given way to the many strange and bizarre pursuits of industrial society, human life has grown steadily more standardized, more mechanized. The bewildering local differences that used to mark off one valley from another linger on only in the remotest mountains or peninsulas. City life is everywhere cast in much the same mould, spent in the same pursuits of buying and selling and making, addicted to the same amusements, confronted by the same problems.

Much of the strangeness and the novelty of this new regimentation of life arises from its sharp break with the habits of the immediate past. Had the organized and collectively directed urban life of the late Middle Ages passed without a break into the machine age, there would still have been a perplexing increase in the scale and sheer bulk of community problems. But amid these growing pains there would not have been felt the sharp wrenches that Western society experienced in the 19th century. For four hundred years every energy had been devoted to breaking away from that tight social control of mediæval society to the freedom and irresponsible individual action of a commercial community. Every great cultural movement that passed over Europe, the commercial revolution, the Renaissance, the Reformation, the Puritan struggles, the coming of science and Enlightenment,

the pioneer movements in the new world, the agricultural changes in Europe, the political upheavals of the French Revolution, the great Romantic reaction,—each of these had been a wave of individualism, a passionate appeal to liberty and freedom. Now the machine was creating conditions that demanded a complete volte-face. The essential problems faced by industrial society had far more in common with those of the age of guilds and feudalism than with any of the intervening epochs. In countries like Germany, where much of the spirit of mediæval social organization and benevolent and wise direction lingered on into the machine age, there was far less of a break, and far easier an adaptation of older habits, than in the more commercialized and individualized states like England and France and America. It is remarkable how easily and on the whole how successfully bureaucratic Germany assimilated industrialism. The same holds true of Japan, where a feudal society consciously took over and introduced a full-fledged industrialism in a single generation. The very lack of any strong individualistic feeling has made it possible for Russia to introduce a similar typically industrial regimentation of life. Germany, we say, is a capitalistic nation, Russia is at present communistic. The meaninglessness of such labels is apparent when we try to distinguish between the two. Both have made a valiant attempt to adapt their political and economic institutions to the machine. The chief difference between German state socialism and Russian state capitalism can hardly be expressed in terms of theory; it belongs rather to the far greater industrial progress of the Reich.

The conflict between the habits of a commercial

society and the demands of the machine has been especially apparent in economic theory. Classical political and economic science was the perfect expression of the demands of a community of merchants and small farmers. When Adam Smith was writing his *Wealth of Nations,* the first rumblings of the factory were just beginning to be heard. The individualistic precepts he laid down promised prosperity for trader and farmer. Free trade seems of all the doctrines of the early economists the soundest; it benefits all classes and harms none. Yet free trade was the first principle of a commercial society to be discarded by industrialism. The next generation after Adam Smith, Malthus and Ricardo and McCulloch and Nassau Senior, preached their immutable laws, not as a golden creed of promise for all, but as the sad truth that nothing could be done about industry. The laws of population would bring forth new swarms of hungry mouths to meet every increase in production. The Iron Laws of Wages would keep the workers' returns at the bare subsistence level. If wages were raised, the market would be flooded with larger families. If the workers combined to better their condition, it could only be at the expense of the employer and the farmer. Class conflict was inevitable, between workers and mill-owners, between business men and landlords. Above all, any arbitrary human interference, even the compassionate care for the unfortunates, the cripples and the poverty-stricken, would bring further disaster. Better to allow the harsh but ultimately beneficent laws of nature to take their course.

Such orthodox political economy was hailed everywhere as the creed of the business classes and the

liberals. It justified both their sheer inability to cope with the problems of crowded cities and swarming factories, and their decided self-interest in seeking the utmost of profits. It offered an industrialized age the medicine that commerce and agriculture had needed. It was a pre-industrial economics. Its only use in urban and factory conditions was to bolster up the short-sighted program of the business class. The laisser-faire it preached was soon directly contradicted by tariff restrictions and by the imperialistic policies of national economic expansion. The very business men who swore by Ricardo and Senior were effecting industrial combinations that made a farce of free competition. They were ruthlessly violating the presumed natural rights of liberty and property, not only of the mill operatives, but even of their weaker competitors. Their class economics was not even enlightened self-interest in the machine age. From Robert Owen and his New Lanark mills to Henry Ford at Detroit, wiser employers have demonstrated the advantages of higher wages and better working conditions, even in securing profits. Yet so firmly ingrained were the principles of free competition, laisser-faire, and the sanctity of property rights, that business men and editors and bar and bench could imagine no slightest modification. It is little wonder that this economic lore became increasingly irrelevant to the actual functioning of industrial life. It has finally achieved the status, in the hands of honest theorists, of a pure postulate system like non-Euclidean geometry. It does not even profess to have a bearing on the facts of the age of mass production.

The small business man, the independent manufacturer, clung to the myth of free competition long-

est of all. He furnished the backbone of the progressive movements of the last generation. In Interstate Commerce Acts, in Anti-Trust Laws, legislatures tried futilely from the nineties down to Roosevelt and Wilson to enforce competition by law. The large business men, the banker executives, knew better. This New Freedom was the last effort of disorganized, petty business to hold its own against mass production. It has been quietly allowed to lapse. Anarchy and the machine are incompatible. The problem of the present is not whether some more unified control shall be allowed. Such combination is here. The question is rather how far it shall be socially responsible.

Slowly an industrial economic theory is being worked out to replace the commercial economics that has obviously been outgrown. In the face of modern industrial organization the many valiant attempts of the last century are of merely historical interest. Even the most successful of all, that of Karl Marx, has been abandoned by his own followers. For all his vision and generous sympathies, Marx was too close to Smith and Ricardo, too entangled in their deductive mechanical method, too ignorant of the functioning of a matured industrial system. Such a genuinely industrial economics must reflect the experimental temper of contemporary science. It must recognize the complexity of present-day industrial facts, the futility of undue simplification into a single broad class-conflict. Yet for a generation the more progressive economists have been too busy securing release from past dogmas, too fascinated with the amazing facts of economic life, to throw much light on a more efficient and socially responsible industrial organization. It is possible that

we must await wholesale experimentation like that in Russia, where men are attempting a unified and centralized control of the entire industrial machine of a nation, before we can advance much further. As yet, the economist has been able only to observe what practical men, communists and labor politicians and bankers and business executives, have been blunderingly and confusedly working out.

The deepest conflict introduced by industrialism has concerned the fundamental social ideal of the whole modern period, liberty. How far the great ideal of freedom can continue to keep men's allegiance is still an open question. Certainly the liberty for which our fathers fought has been made impossible for us. Irresponsible freedom of individual action, the right to govern our lives as we wish, to do what we like with our own, has gone. It can have no place in an urban, industrialized community. Yet so powerful is its appeal, so deeply has it entered into our traditional standards, that we are not yet willing to forswear it for new gods. That was a crude and simple-minded conception of liberty, we explain; real liberty, true freedom, is something far different, far higher and nobler, far more difficult to attain. For a full century the most thoughtful men have been trying to reinterpret the ideal of liberty in social and scientific terms suitable for the laboratory and the machine. Insensibly we have come to realize that sheer independence of action is not the goal of human endeavor. That way of life has degenerated, until to-day its chief advocates are those proclaiming aloud the inalienable human right to drink. Even that bright mirage of the 19th century, national independence and complete self-

determination of political states, has grown tawdry and tarnished. In international affairs we can now perceive a rule of conduct more in consonance with a world united and integrated by science and industry and commerce than the right to defend the national honor by blood and iron.

It would be generally admitted, in theory, that the most precious of all the liberties won by our fathers is the right to think and believe and speak for oneself. In the face of the manifold onslaughts of ignorance, prejudice, and interest, that right is still worth a determined struggle. Yet it is a difficult question whether even the right to believe what one wishes is still possible in our world. No one doubts that the honest freedom of inquiry, the right to follow truth wherever it may lead, is one of the most precious achievements our society can strive after. So long as we are committed to science and industry, such free inquiry is absolutely essential. Yet even free inquiry presupposes certain essential conditions. It demands the acceptance of the best methods of investigation and verification. It demands a knowledge of essential facts already established, before one can go on to new knowledge. In an earlier day, when all was in doubt, it may have been possible to trust any happy guess. At present, when we have reason to believe ourselves in possession of certain established facts, we have the right to exact that a new theory shall either adjust itself to them or show us where we have been mistaken.

How much longer, for example, can our society allow men to act on honest conviction in opposing vaccination as dangerous and futile? How much longer can it allow the ignorant to be overwhelmed by propa-

ganda that flies in the face of all sound medical knowledge? How far can it tolerate the practice of sincere religious beliefs like those of the Christian Scientists, which entail such grievous consequences to others? Every advance in exact knowledge makes the toleration of ignorance more dangerous. It is easy to foresee a time when such doubts might extend to the secure findings of a genuine social science.

No candid man to-day could contemplate the suppression of unverified theory without the deepest alarm. We are too aware of the abuses to which such measures would lend themselves. The cocksure dogmatism of the eugenicists, for example, bodes ill for any scientific control of beliefs. Yet there is little doubt but that we are approaching a time when we shall be so sure of our scientific theories that we shall attempt a far more rigid control of education and beliefs than even the Church established at the height of its power. It will be fortunate if our descendants are able to distinguish between ignorance and new imaginative insight.

In conduct, in all action that affects our fellows,—and what action does not?—we have already abandoned the older individualistic liberty. We scarcely realize to what extent, until we read the tirades of a Victorian liberal, like Herbert Spencer, against forms of social control that seem inevitable to us. To suggest that the government establish schools and regulate public education is as unthinkable, said Spencer, as to propose that it take steps to insure the purity of the milk supply. We have come to realize that genuine freedom demands the social enforcement of its necessary conditions. We no longer, except in judicial deci-

sions, laud the freedom of contract that allows a mother to accept night-work at a starvation wage. The liberty possible in an industrial society is the socialized liberty that enforces the prerequisites of the fullest liberation of human capacities and energies.

In the mediæval wisdom of Augustine and Thomas, perfect liberty was perfect obedience to perfect law. Spinoza, the prophet of the new mathematical science, rephrased this ideal as complete determination by reason and truth. The Romantic poets and philosophers invoked the same conception against the irresponsible freedom of the 18th century business men. Our experimental science would in turn define liberty as embodied intelligence. No one knows how much longer we shall have to fight for the very right to be intelligent. There is little enough of the scientific spirit in our contemporary society,—little enough in the organized structure of scientific investigation itself. Yet it is becoming clearer that a society in which a genuine liberty is the possession of its members must be a society in which intelligent beliefs are held and intelligent customs and laws followed.

No pianist is free to create undying music who is ignorant of the structure of his instrument and the principles of harmony and counterpoint. Perfect mastery involves the most rigorous discipline. We may never be able to master the infinitely more complex instruments of industrial society. But one thing is sure: the creation of a free and satisfying human life can no longer come without patient and intelligent social control.

IX

THE ADVANCE OF SCIENCE

While industrialism was transforming the face of Western society, science was transforming its mind. Its first great wave of popularity in the Age of Reason had subsided into the non-scientific interests of the Romantic movement. The fact that religious enthusiasm, artistic creation, and practical political and economic pursuits were for a time uppermost in men's minds, undoubtedly kept a large number of gifted individuals from embracing a scientific career. But on the whole the diversion of popular attention from science was most salutary. It freed science from the very real danger of becoming a mere adjunct of social movements, a kind of handmaiden of politics and economics. The laboratory was left in peace to develop the implications of the ideas and methods it had already won. The very disrepute in which Newtonian ideals stood prevented the tyranny of a narrow dogmatism in physics itself. The keen criticism of penetrating thinkers from Kant to Hegel broke down rigid methods and inadequate concepts, and warned scientists that their enthusiasm must not lead them to neglect the richness of the experience they were seeking to explain.

Left to themselves, serious investigators steadily advanced in explaining the phenomena of nature in accordance with the mechanistic and mathematical

principles formulated by the pioneers of genius in the 17th century. More and more facts were brought to light by an increasing army of observers. The ground was prepared for the great generalizations of the early 19th century, and the extension of exact methods to new fields like chemistry and biology. In abandoning the extreme claims of the Age of Reason to final and ultimate truth, the scientists were really consolidating their position and placing it on a far sounder foundation than the brilliant if one-sided insights and imaginative glimpses of earlier genius. By the fifties a vast body of undeniable facts had been brought to the support of theories that the Enlightenment had accepted largely on faith.

As a popular movement Romanticism had by this time almost run its course. Its liberating and enlarging message had been learned. Men were willing once more to acknowledge the value and necessity of exact formulations and precise standards. Even the Romanticists themselves, at the very time they insisted on larger horizons and richer data, had come to appreciate intelligence. The movement that began in the complete rejection of reason and the appeal to the non-rational elements of life, had culminated, in Hegel, in a far more thoroughgoing triumph of reason than the Enlightenment had dared to proclaim. What it had rejected as irrational and therefore beyond the pale, Hegel dared to assert possessed as much of rational structure and order as the very stars.

Men were therefore prepared to accept the new triumphs of scientific thought. The sheer amassing of successful explanation, the piling up of verified theory after theory, began at last to make an impression on

the educated class. At just the right moment to win popular acclaim, the biological theory of evolution burst on the world. The very efforts of the conservatives to denounce and extirpate this new heresy provoked controversies in which the fundamental principles of the scientific faith, as well as the great generalizations that had been achieved in all fields, were spread broadcast among the educated class. The new institutions of popular education felt the force of this returning popularity of science, and for the first time science was actually taught in school and college.

This time science had a powerful ally in industrialism. The previous era of scientific worship had seen in science not so much a useful instrument for changing man's material environment, as a great liberating idea, the rational order of nature. Newtonian science had won its popular acclaim because it offered an alternative to a theology of whose controversies men had grown tired, and to an antiquated set of social institutions from which they desired release. The order of nature had been the great intellectual weapon against the old régime in church and state. It offered a secular explanation of life, and a rational alternative to tradition. Nineteenth century science, to be sure, appealed to the same anti-clerical and anti-traditional desires. It was welcomed everywhere by rebels against the recently strengthened religious organizations, both Catholic and Protestant. It made a powerful appeal to the revolutionary leaders of working-class movements; Marxian socialism has owed much of its strength to its hardly justified claim to be the only completely scientific social theory.

But it is doubtful whether the main strength of

science during the last three generations has been drawn from the same sources that gave it popularity during the 18th century struggle against the old régime. The matter was complicated by the persistence of Newtonian political and economic science as the creed of the dominant business class. In the face of the accredited claims of orthodox liberal economists, it was impossible to justify social revolt in the name of science alone. While there has been since the fifties a strong atheistic and materialistic movement that has repeated the arguments of the Enlightenment philosophers, with such embellishments as were suggested by the advance in physics and biology and historical criticism, the real triumph of science has sprung rather from the growth of technology. Where Newtonian science stood primarily for a great revolutionary idea, the science of the last seventy-five years has won its prestige through its practical fruits. Where the typical image of the Newtonian scientist was the astronomer in his observatory surveying the orderly movement of the heavenly bodies, the popular notion of the scientist to-day is the inventor in his laboratory. When we think of science, we do not think of mathematical calculation, of the law of gravitation, of the rational order of nature that governs every phenomenon. We think rather of the electric light, the dynamo, the airplane, the automobile, the phonograph, the movie, and the radio.

The scientific picture of the world no longer appeals by reason of its simplicity and harmony and order. Closer investigation has destroyed that earlier scientific faith. Contemporary physics is anything but simple; its complexities and basic concepts are far

more difficult of comprehension than the most involved theologies of old. Modern biology and psychology and anthropology reveal anything but harmony and order in a bewildering scene of struggle and passion. Not the simplicity to which Galileo and Descartes and Newton appealed, but the power and practical results promised by Bacon,—these are the foundations of our own scientific faith. We are committed, body and soul, to industrialism and mechanical mastery of nature; and to such concerns science is indispensable.

So dependent has scientific thought become upon the machine that an excellent case has been made for the instrument of precise measurement as the basis of all scientific advance. It is certain that every triumph of 19th century physics has been founded on more exact means of observation. From the great generalizations about energy to the most recent theories of relativity and atomic structure, every new theory has started from data afforded by measurements of inconceivable delicacy. The whole structure of modern chemistry, and much of experimental biology and psychology, has been built on the balance and the microscope. Natural science has become increasingly parasitic upon the machine.

If the authority of science to-day exceeds all other authorities, except only that of the nation, it is not because even the educated are aware of the complicated verifications to which scientific theories are subjected. The very meaning of those theories has become something esoteric, open only to the initiated and the mathematically expert. The prestige of science rests on its practical fruits in machines and technological processes. The scientist has wrought miracles;

the rest of us unhesitatingly believe. We ask for a sign, and receive the radio. Science therefore must be true. Our attitude is not unlike that of the mediæval believer who had unquestioning faith because he had seen with his own eyes the miraculous cure or the vision of the saints in glory. The only difference is that for us the miracles never fail. Painfully, therefore, the more curious of us seek to understand something of the faith we share. This faith of ours is a living faith, for it concerns the very life we lead, in its most intimate details. It is the faith that has given birth to the machine, to every mechanical device that makes our life and our civilization possible. Natural science is the lore of a mechanical culture. For the poets and philosophers of Heidelberg or Jena a century ago, it was perhaps possible seriously to question the reality and adequacy of science. There in those old-world valleys, untouched by the slightest hint of the industrial revolution, men could weigh science as a philosophy of life, and reject it in favor of a philosophy closer to the well-springs of their own experience. In New York or Pittsburgh, London or Birmingham, Berlin or Essen, that rejection is quite impossible. Science is for us no theory; it is a hard, inescapable fact, to which we must adjust ourselves as best we may. Its fruits have entered too deeply into our daily experience for us to disregard their source.

In the popular mind, 19th century science is still synonymous with the theory of evolution. Evolution was undoubtedly the most revolutionary concept to achieve wide influence. In introducing the dimension of time as of cardinal importance, it involved a sharp break with Newtonian mechanics. It was the first great

idea of modern science that had an immediate and obvious applicability to life, and to human life in particular. The notion of man's animal origin gave a peculiarly dramatic insistence to the inclusion of man himself and all his interests in the order of natural law. For all these reasons, the idea of evolution spread rapidly into every field of investigation. It was the dominating notion in the many new sciences of human society. It even penetrated into the sciences of inorganic nature, and theories were proclaimed of the evolution of the chemical atoms, of the stars, and even of God himself.

Whether the notion of evolution was the most important development in 19th century science, however, is more doubtful. Modern thought has recovered somewhat from the enthusiasm of the last generation, and is much more critical of the lengths to which the worship of evolution as an explanation for all difficulties was pushed. The very fields in which it seemed for a time to be a universal solvent are to-day much more concerned with detailed investigation of observable processes than with such large historical generalizations. To sober second thought, there seems to have been much of accident in the popularity of evolutionary notions. Darwin's theories appeared at the psychological moment, and immediately became the storm center of the battle for and against the scientific faith. They thus achieved a prestige far above their just deserts as scientific explanations. Evolution, moreover, offered a seeming explanation of the significance of the cosmos. It set human life at the apex of a long development; it read a meaning into the course of the universe that had been absent in the purely mechanical

Newtonian order of nature. Evolution possessed, in fact, a religious value; it was accepted as a scientific rendering of the traditional faith in God's providence. It had first appeared in the thought of Romanticists reflecting on the course of human history and institutional change; and much of the rapidity of its spread among progressive thinkers was due to the simple fact that they had been accustomed to it for a generation in the Schellings and Hegels of the Romantic movement. With Wallace and Darwin, biology seemed to be accepting and extending an essentially Romantic concept. The new evolutionary social sciences certainly owed far more to the thought of the Romantic social thinkers who had rebelled against the naïve individualism of the Enlightenment than to the spirit of biological investigation. It has taken several generations to introduce in them a genuinely experimental and investigatory method.

Far more important ultimately, in its effect on strengthening the growing faith in science, was the detailed working out of the principles of mechanistic analysis, of explaining natural phenomena in terms of the simpler actions of the elements into which they were resolved. This was the method of investigation proclaimed by the pioneers of the 17th century. It was not nearly so novel as the notion of biological evolution, and in consequence it did not so impress the popular imagination. Yet the sheer cumulative effect of one triumph after another, on the very lines indicated by Newtonian science, was irresistible. On the one hand, just as Newton himself had unified the empirical discoveries of his astronomical predecessors into one mathematical structure by his laws of motion, so the

19th century physicists embraced in one mathematical system all the observable physical phenomena. More and more fundamental generalizations were worked out, and the simple process in terms of which the more complex were explained was deepened and more precisely defined. On the other hand, the same method of analysis into the behavior of simpler elements was successfully carried into fields where it had previously been only the scientists' faith. Biology and psychology were thus conquered by analytic thought, and the beginnings of a genuinely scientific study of society were made. As an incident in this spread of mechanistic analysis, it was applied to the study of origins as well as of present-day processes. Biological evolution appears as one of the fruits of this concern with the analysis of genetic processes.

The main principles of the scientific method of the 19th century are not difficult to grasp. Complex processes are explained, it was held, when they have been analyzed into the simpler processes that combine to effect them. Both heat and sound are understood when they are seen as forms of molecular action. Such analysis involves both the discovery of the simpler component element that enters into the phenomena,—in the case of heat and sound, the molecule,—and the precise, mathematical formulation of the laws of behavior of that element. It is assumed, of course, that phenomena that can now be investigated have always occurred in the same manner, and always will in the future. Natural processes take place with uniformity, so that past events are to be read in terms of processes capable of experimental investigation to-day.

The 17th century physicists had brought both the

movements of the heavenly bodies and the gross movements of terrestrial masses under the same laws of motion, thus sketching the main outlines of molar mechanics. At the very beginning of the 19th century, a number of investigators extended these concepts of matter in motion to account for both sound and heat. The notion of kinetic energy, of the energy of motion of molecules, was precisely formulated in the experiments of Joule, Mayer, and Helmholtz, culminating in the momentous doctrine of the conservation of energy. About the same time, Young and Fresnel were describing both light and radiant heat as forms of wave-motion in a supposed ether, while Faraday and Kelvin were bringing electricity and magnetism together under the concept of the electro-magnetic field. Clerk Maxwell, Helmholtz, and Hertz identified the ether waves of optics with the electrical disturbances of an electro-magnetic field, and formulated the basic mathematical equations describing the action in such a field. Beginning with Dalton, the chemists, to explain chemical reactions, had analyzed the molecule itself into chemical elements or atoms. Toward the end of the century experiments with the cathode ray emitted by a vacuum tube had led Rutherford to suspect that the atom itself might be analyzed into component parts, a conclusion to which chemists had been led independently by such phenomena as ionization and radio-activity, and by the orderly character of the periodic table of chemical atoms. The atom seemed composed of a nucleus or proton, appearing as a definite charge of positive electricity, and a number, varying with the particular element, of negative charges or electrons. The problem of the precise nature of atomic structure is the chief inter-

est of present-day physical research. Several theories are advanced, the most widely held, that of Bohr, picturing the atom as a kind of infinitesimal solar system, with electrons revolving in definite orbits about a central nucleus or proton. Finally, the theory of relativity, besides offering a more satisfactory mathematical formulation of the principles of mechanics, seems to have closed the chief gap still remaining, that between mechanics and electronic behavior, by assimilating gravitation to the action of an electro-magnetic field.

In one sense it would appear that the hope of the founders of natural science, that eventually all phenomena might be explained in terms of the action of one single type of element, had been fulfilled. That element would be the electron, and as the fundamental stuff of the universe, it would be susceptible of mathematical formulation without the introduction of qualitative differences. It would, however, be more correct to say that the ultimate element has been found to be, not a thing, the electron, so much as the complexly related energies of the electro-magnetic field. What is experimentally observable as the last term of analysis is not a thing or substance, to speak in the terms made familiar by both common sense and Aristotelian thought; it is rather an organized system of radiation, a region from which energy radiates in accordance with definitely ascertained laws. The various natural phenomena, even matter itself, appear thus as certain organized expressions of a field of energy. The last triumph of analysis reveals not a simple element, but a system of organization, as the component of the world.

Experiments with light, carried on by Max Planck, have shown that the radiation of energy is not contin-

uous, but proceeds in regular spurts, or periodically. This periodicity that occurs in all such radiation, whether we observe light, electricity, or the behavior of atoms, can be represented in the equations by the same definite constant. Thus matter in motion, gravitation, sound, heat, light, magnetism, and electricity—all physical phenomena, in fact, are ultimately connected with the periodic radiation of an organized field of electro-magnetic energy.

The outcome of a century of painstaking analysis has thus been a triumphant vindication of the pathfinders who dared hope that a complete mathematical interpretation of natural phenomena was possible. Yet the steady advance of the analytical method, from mass to molecule, from molecule to atom, from atom to electron, has for the present resulted in finding, not a simple element, but a complex system of processes, periodic energy, as the ultimate term of explanation.

While such basic generalizations were thus drawing together the phenomena of physics and chemistry, the same method of explanation through analysis into simpler processes was meeting success in the sciences of life. The analytical method applied in biology meant the interpretation of the processes of living organisms in purely chemical terms. From the laboratory creation of typically organic compounds it was a short step to the investigation of the chemistry of the processes of living beings. Liebig, Johannes Müller, and Claude Bernard were pioneers in this organic chemistry. Gradually the conception took form that life itself is but a series of especially complicated chemical reactions. Every achievement of experimental biology has been made through the assumption of this so-called mechan-

istic theory of life. The biologist has come to regard living organisms as chemical machines consisting chiefly of colloidal material. They differ from non-living matter in being able to put together their own specific material from the simpler compounds of the surrounding medium; this is nothing but a complicated chemical reaction. The actions of organisms, from lowest to highest, are to be explained in terms of tropisms, that is, of purely chemical reactions of a specific type. For the lower forms of animal life these reactions have been isolated; much that common sense attributes to instinct, like the caterpillar's discovery of food, has been shown to be the reaction to a purely chemical stimulus.

Not only the processes, but the origin as well, of living organisms is to the experimental biologist a matter of chemical equations. Bisexual organisms as complex as the frog have been chemically fertilized from the egg-cell alone, without the presence of male spermatozoa. The work of Pasteur proved that the confidence of earlier biologists that living organisms are being generated spontaneously from decaying inorganic matter, had been premature; it revealed a whole new world of micro-organisms. Nevertheless, the overwhelming majority of investigators to-day hold that life did so originate, when conditions were favorable; and many believe that such conditions are being daily repeated. Some even look forward to the creation of living matter in the laboratory, once the regulative chemical or enzyme has been isolated.

The few dissenting biologists who question the adequacy of these purely chemical theories of life, and point out the many gaps in the present science, have no alternative to offer that promises any hope for scien-

tific investigation. To insist, as the "vitalists" have done, that in addition to chemical reactions life springs from some "principle of life," some entelechy, is to remove the whole matter from the laboratory and preclude the possibility of a scientific explanation. Vitalism has no impressive experimental achievements to point to, while mechanism offers a program of research that has borne amazing fruits. It is true, however, that the confidence expressed a generation ago by such men as Jacques Loeb, that the complete chemistry of the organism was on the point of discovery, has somewhat subsided. To-day biologists are aware that the specific organization is both complicated and important. In biology, as in physics, more and more emphasis is being placed on the notion of an organized system of processes as possessing as great ultimacy as simpler elements.

After almost two centuries of devotion to the introspective method, psychology has also achieved a firm experimental basis as a branch of biology. The theory of human nature that arose in imitation of Cartesian mechanics assumed that the mind was a compound of simple sensations. Impressions received through the sense organs were combined in the mind in accordance with the mental counterparts of the laws of motion. Two sensations received simultaneously or in succession were henceforth associated together. In thus analyzing human nature into sensations as the simple element, and association as the simple process, the associationist psychologists were following the crudest mechanical analogy. Their psychology has been of immense importance because of the political and economic theories founded on it; but as a scientific explanation

of human conduct it has proved sterile. Some fifty years ago a fresh start was made, under the stimulus of the idea that man is essentially a biological organism. Physicians like Wundt and William James sought a physiological analysis of the behavior of human beings. The biological concept of the reflex action was made the simple element; it had the advantage that it could be experimentally investigated under laboratory conditions without recourse to the deliverances of self-examination. James made the central problem of psychology the discovery of the physiological changes in the nervous system which are the root of human conduct. His followers, notably the somewhat dogmatic behaviorists, who reject completely any other method, have patiently pursued the study of the physiological reactions of the human organism as a whole. To them, human nature is a bundle of potential reflex actions, capable of being organized into complex habits by a conditioning environment. Both reflexes and their conditionings are conceived ultimately in chemical terms. During the life of the individual, various stimuli, from within and without, build up an organization of reflexes which in its various aspects is known as the will, character, and personality of the man. The entire process is conceived as a physico-chemical modification of the nervous system.

There is obviously many a gap here to be filled in. Above all, the functioning of the integrated personality is far too complex for any instruments of analysis hitherto attained. In psychology, even more than in biology, there are many dissenters, and many romantic theories still popular. The whole theoretical structure by which the psycho-analysts have sought to explain

their impressive practical cures harks back to the cruder theories of the Romanticists. Nevertheless, they have brought to light certain forms of behavior, the complexes, or emotional drives resulting from repression, which seem quite capable of explanation in more experimental terms, and which add to our knowledge of the habit formation of the individual. In psychology as elsewhere the earlier theories were too simple, too little aware of the complex organization of elementary processes involved. Here also it seems likely that the specific organization will prove as important as the simple element that is the product of analysis.

The conception of human nature which emerges from this analysis of human conduct into its biological elements is far removed from the simple calculating machine which figured in 18th century social science. Man is a creature of biological impulse and passion, able under favoring circumstances to achieve a certain organization of his drives into what we call intelligent action. His behavior is largely determined by forces and energies which demand normal outlets, failing which all manner of distortions and conflicts and outbursts supervene. Plastic as his habits are, there are certain limits which cannot safely be passed. His more important impulses, above all the fundamental sexual drives, must be given adequate scope; only ends of extraordinary intensity can make either mediæval or Puritan or factory asceticism succeed. Men are individuals. They differ widely, apparently even at birth, in their capacities and their aptitudes; the organization they achieve is a personal and unique synthesis. Finally, men become what they are only because they live and develop in social groups that condition the organization

of impulse they shall attain. Human nature is a product of group customs and traditions. It is obvious that all these points come into more or less open conflict with our own traditional views and standards. Where this modern socio-biological notion of human nature has taken hold, both 18th century individualistic social science, and the far deeper moral standards of the Hebrew-Christian tradition, have been subjected to drastic reconstruction.

The scientific method of mechanistic analysis deepened the element in terms of which physical phenomena were explained, and unified the entire structure of physics and chemistry; it advanced into the fields of biology and psychology to connect them with chemistry. One other great realm had been opened up by the Romanticists, that of history and temporal change. The most novel triumph of the scientific spirit during the 19th century was to take the conception of growth and development, elaborated first by Romantic poets and philosophers like Herder and Hegel, and applied to the history of human institutions by the great German historical school, and formulate it in precise terms capable of experimental verification. The Romanticists had called attention to the problems of origin and genesis neglected by Newtonian science, which kept its eye on present processes. Influenced partly by the Romantic philosophers, partly by the same set of revolutionary social changes which stimulated so intense an interest in temporal growth, natural scientists turned their tried method of mechanistic analysis to this new set of problems.

The cardinal principle in the scientific investigation of origins is that the same processes observable and ex-

perimentally verifiable to-day have operated throughout the past, that past development is to be explained by an appeal to such laws and such laws alone. This basic principle of naturalistic uniformitarianism was what distinguished the scientific study of origins from the less rigorous theories of the Romanticists. It enabled men to hold fast to the 18th century conception of the world as essentially a great machine acting in accordance with the reign of universal causal law, and at the same time to transform that machine from a mechanism conceived on the analogy of a man-made contrivance, sprung full-blown from the hands of its Creator, into a machine that, following its own laws of development, has gradually out of simpler beginnings assumed its present complex structure. It is really the extension of the notion of an all-embracing and immutable Order of Nature to temporal change itself. The scientific explanation of large-scale, cosmic changes comes from the discovery of an immutable structure in the processes which can be reached by present-day analysis. This fundamental principle of the uniformity of nature is a basic assumption, to which investigators have been driven by a mass of detailed data, and upon which they found their research. It is one of those ultimate postulates of the scientific faith whose validity comes only from the fruits it bears in clarification and fresh insight.

Just as the mathematical interpretation of nature had begun in astronomy, so did the application of this new concept of uniform development. For Newtonian science, the solar system had been made complete at a moment of time; its machinery once started rolled on unchanged. In the late 18th century several men, like

Buffon and Kant, suggested that it had developed from a nebula like those observable in the heavens. The mathematician Laplace elaborated this nebular hypothesis to account for the origin of the solar system whose present workings he so completely described in his *Celestial Mechanics*. The fact that his theory of condensation into concentric rings has been supplanted by an alternative planetesimal hypothesis that seems even closer to the observed facts of the spiral nebulæ, does not alter its fundamental significance. For the first time, celestial phenomena were conceived as essentially processes developing through time rather than as eternal recurrences. The stars had a significant history, itself the result of the operation of uniform mechanical forces.

Working on Laplace's hypothesis, the geologists sought the course by which the earth had developed from its original incandescent state. Field observers like James Hutton and William Smith collected a mass of data about fossils and their distribution, and about the erosive action of water. Hutton insisted that all past changes of the earth's surface are to be explained as due, not to catastrophes and cataclysms springing from divine intervention, but to the constant working of causes now in operation. It is to the action of rain, rivers, the sea, chemical decomposition, and internal disturbances, such as we can see going on about us now, that we must turn as the key to the past. This application of the uniformitarian principle to geology was made the foundation of Sir Charles Lyell's epoch-making book, which, appearing in 1830, caused a profound impression on the educated class. The success he achieved in bringing order out of what had before

been chaos, by substituting for miracles the operation of constant natural causes over immense stretches of time, overthrew completely the traditional notion of a creation a few thousand years ago. The earth was immensely old; room was given for an almost unlimited series of changes. For the first time our modern scientific universe emerged, as boundless in temporal as in spatial extent.

With such an extension of the duration of the globe, opportunity was afforded to regard the forms of life as themselves the products of a slow development. In the Newtonian world, natural historians had believed with Linnaeus in the fixity of species. Such a doctrine accorded well with the immutable order of nature. Such naturalists as Buffon, Erasmus Darwin, and Saint-Hilaire; such romantic philosophers as Goethe, Oken, and Schelling, had revived Greek speculations as to the slow evolution of present forms of life. But not even the greatest of these 18th century evolutionists, Lamarck, was able to suggest a theory as to the causes effecting the transformation of species that could pass the tests of mechanistic analysis. Lamarck's explanation, that organisms adapted themselves to a changed environment, and that these adaptations were transmitted to their offspring, was a uniformitarian principle; but it could not appeal to experimental verification in the laboratory. It was not till Charles Darwin and Alfred Russel Wallace, working independently, succeeded in developing a mechanistic theory of the causes of biological evolution, that men abandoned the notion of fixed species.

Darwin accomplished two tasks. He undertook a detailed investigation of the living and fossil forms

of life that pointed to the precise succession of various species in time; and he advanced a plausible and verifiable theory to account for these changes. The mass of evidence in his *Origin of Species,* gathered over thirty years, from geographical distribution, from paleontology, from comparative anatomy, from embryology, and from experimental breeding, has sufficed to convince all succeeding biologists that whether we can explain how it occurred or not, the evolution of species has been a fact. Darwin's causal theory of natural selection was probably even more important in gaining rapid adherence to his hypothesis. He had been struck by Malthus's contention that the food-supply increases much more slowly than the offspring of animals. The bitter struggle for existence which Malthus and the other economists saw in economic life, Darwin took as the key to the whole of organic nature. Only the most favored individuals could survive. Slight variations are always occurring in offspring; hence favorable variations would tend to be preserved, and unfavorable ones to be destroyed. What the breeder does by his careful artificial selection of the parents of the stock he wishes to secure, the fierce struggle for existence in nature does for all organisms. Only the fittest, those best able to protect themselves and gain a living, can survive. Chance variations coupled with natural selection are the cause of new species.

That species have evolved is as firmly established as any scientific law. The mass of cumulative proof has piled up since Darwin's day without a single bit of negative evidence. Ironically enough, however, Darwin's own theory of the causal factors operating in

the evolutionary process, which played so important a part in the rapid acceptance of the evolutionary idea, has since seemed far from adequate. The more that has been learned about the detailed mechanism of heredity, the more difficult it has become to believe with Darwin that slight chance variations could ever be inherited. Most investigators have turned to de Vries' theory that the new organism arises, not gradually through many generations, but suddenly, in a complete jump or "mutation." A few such mutations have been actually observed; therefore it seems wiser to take chance in large gulps rather than small driblets.

The causes of the occurrence of mutations are unknown. Contemporary biologists are much more cautious and hesitant than those of a generation ago. The matter is complicated by the fact that investigations conducted by Weismann and others have shown that the germ-plasm from which the future offspring is to develop is, from its very formation, so completely cut off from the parent's body that it is difficult to see how any outside influence could affect it. Nothing acquired by the parent, it seems, is transmitted to the offspring. Patient experimental breeding has shown that certain conditions, like a changed environment or a definite injury, can directly affect the germ-plasm itself so as to cause a distinct variation. But the conviction that these changes are the result of chemical alterations in the germ-plasm is still largely the fruit of the scientific faith in natural processes.

In one other respect, mechanistic analysis has triumphed in biology. The work begun by Mendel on the mechanism of heredity has placed the matter on

a definitely atomic basis. In the germ-plasm, both male and female, are specific bodies called chromosomes, which are the bearers of the characteristics of the mature organism. There are a fixed number of "unit characters" determined by the chemical constitution of the particular chromosomes that unite to form an embryo. These unit characters can be mixed in a large number of ways, in accordance with the mathematical laws of combination; heredity normally occurs much as one would shuffle a set of alphabets together. The more clearly we learn, however, the various possibilities resident in a given pair of germ-plasms, the more difficult it becomes to conceive how a new unit character can emerge. That problem cannot be solved till further light has been shed on the chemical constitution of the chromosomes themselves and the changes that, occurring in them, can give rise to new mutations.

When he had marshaled another overwhelming mass of evidence, Darwin published, in 1871, his *Descent of Man*. Human beings were definitely placed in the evolutionary series, as a product of the same struggle for existence that has produced, say, the tubercle bacillus or spirochæta pallida. At last biology had furnished specific evidence to prove what Spinoza and a few 18th century theorists had maintained as a consequence of their general scientific faith, that man is as much a part of the natural order as any object in the cosmos. Henceforth any sharp gulf between humanity and the rest of nature was impossible. Man's aspirations might reach heaven, but his life was animal in its origin.

The spread of the methods of mechanistic analysis to fields and problems quite outside the scope of the

more limited science of the 18th century was bound to have a reaction on physics itself. Newtonian mechanics had been exceedingly abstract; it dealt with a world of masses, conceived as small billiard-balls or their combinations, moving in accordance with the simple laws of motion. It is little wonder that the type of concept capable of dealing with the motion of masses, the ideas of time and space and of causal relationship that sufficed Newton, proved unable to formulate the more complex relations of the world revealed by 19th century investigation. The Romanticists had insisted on an enlargement of scientific method, on the validity of many concepts naturally inapplicable to mechanics. Hegel had accomplished a complete reconstruction of rational methodology to suit the wealth of social, institutional, and historical facts brought to light by the poets and historians. Unfortunately he had lacked a sufficient appreciation of the importance of mathematics and mechanical analysis. But when living organisms, in their processes and development, became a fit subject-matter for exact scientific thinking, the methods and concepts of that thinking were inevitably enlarged. For the first time in the modern era, biological materials played a determining part in scientific thought. In consequence, scientists found themselves forced to use notions that had been all-important in the essentially biological science of the Aristotelian tradition, and that had been abandoned as contrary to the scientific spirit by the mechanically and mathematically-minded thinkers of the 17th century. As more and more of the richness of experience was incorporated in the structure of exact science, the older Aristotelian ideas came to a new

birth. Finally, the increasing complexity of the data of physical science demanded a drastic reconstruction of the inherited formulæ of Newtonian physics. In the present generation, many of these concepts worked out in the sciences of life and of man have filtered into physics itself. The reign of the basic mechanistic assumptions that prevailed from the time of Descartes and Newton seems about over. The most revolutionary intellectual movement in contemporary science is just this transformation of the very foundations of physics. Biological ideas have forced their way into mechanics.

Most important of all is the fundamental significance of time. Proclaimed first by the Romanticists, rendered more precise by the biologists, this cardinal position granted to time is central in our reconstructed physics. Where the Newtonian world dealt with objects, substances or things, to which time was a mere accident, contemporary physics finds its units, not in things, but in processes and events. It starts from occurrences with definite locations both in space and in time, and its ultimate data of verification are similarly observed events. The exact measurements possible to the delicate precision instruments of the present have made it essential to date every observation. Systems of temporal measurement are inextricably bound up with the coördinates of spatial location. It is no longer sufficient to speak of an object in a certain position; instead, the physicist describes the temporal series of events manifesting themselves in various spatial positions. We have already seen how it is no longer possible to speak of an ultimate unit reached by physical analysis, in the sense of a simple

substance or thing. Instead, all analysis results in the discovery of a system of energy; that is, in a complicated series of events occurring in different portions of an electro-magnetic field.

The very notion of causation, so basic in the older physics, has undergone a corresponding alteration. Where a cause-and-effect relation was formerly conceived on the analogy of the physical impact of billiard-balls, it is now thought of as the mathematical correlation between two or more series of events. Cause and effect are related, not as push and reaction, but as simultaneity of occurrence. This very notion of simultaneity has necessitated, of course, complicated schemes of measuring time.

Moreover, the notion of systematic structure, of functional relations within an organized whole, has loomed up as increasingly important now that analysis has found its simple processes and is more and more concerned with their coödination in complex phenomena. Physical phenomena are "certain organizations" of electronic energy; life itself is a "certain organization" of chemical processes; human conduct is a "certain organization" of prepotent reflexes. Organic, functional relations are to-day the primary concern of the scientist in every field. We have advanced beyond the time when it sufficed to discover simple elements or processes. What we want to know to-day is how they are put together.

Finally, the study of living beings has emphasized the statistical nature of all formulated laws of science. Individuality is at the core of the universe; natural laws are at best statistical approximations of the behavior of an immense number of occurrences each with

its own shades of variation. Formerly the approximate character of scientific generalizations could be blamed on the crudity of instruments of measurement. To-day so precise are our tools of investigation that we suspect the inaccuracies lie in nature herself. The very order of nature, so sublimely simple and harmonious to the founders of our natural science, is dissolving into the simplicity of statistical mathematics. Just as a distant mountain chain loses its simple masses as we approach it more closely, so the processes of nature reveal their irregularities and manifold variety on near inspection. The statistical habit of mind, which thinks of all general principles as the averages of innumerable varying cases, and of all fixed relations as certain degrees of statistical correlation, is rapidly assuming basic importance in the scientific spirit.

Nearly all the simple mathematical laws of the Newtonian era have turned out to be special cases of the much more complex formulæ necessary for an adequate description of observed events. From the laws of motion down, the statements of the elementary text-books have been fitted into a much more elaborate and more closely integrated mathematical structure. Of late it has seemed that even the familiar geometry of Euclid is but an approximation of the spatial structure of our world.

In consequence of these revolutionary changes in method and concept, it seems doubtful how much longer the great generalizations of the 19th century, reached by logical implication from simpler data, can retain their validity. Such principles as the conservation of energy or the laws of thermodynamics, upon which so many of the negative dogmas of the scientific

faith were founded, are already revealed as pure speculation. Even the basic tenet of the universal order of necessary law, the fundamental doctrine of scientific determinism itself, has been challenged by many a reputable thinker as inconsistent with the experimental data. All such assumptions, necessarily speculative, necessarily subject to continual modification, emerge to-day less as statements about the structure of nature than as exceedingly valuable intellectual tools of scientific investigation. It may well prove that the tight mathematical system of early modern science was but an episode in the development of accurate thought, and that with the achievement of a more experimental, statistical spirit scientists will put that traditional logic behind them, as they have already discarded the substantial concepts of Aristotle.

The simple fact is that after the achievement of the unifying generalizations of the middle of the 19th century, an army of laboratory investigators brought to light so many new facts that the older theoretical structure has broken down. There are many places to-day where one theory is employed to explain one set of facts, and another, logically inconsistent with it, to explain another. No satisfactory adjustment has yet been found, for instance, between the wave theory of light and the quantum theory; yet neither will embrace all the evidence. It is possible that science will remain pluralistic. It is possible that the contemporary revision of the older theoretical structure will succeed in unifying it once more. In any event, the narrow dogmatism of the 19th century has gone. As one of the greatest of the philosophers of science has put it, we can hardly insist to-day on the universal reign of

mechanistic law when we are in doubt as to the very foundations of mechanics itself. Science has advanced far beyond the position it occupied fifty years ago, when it seemed to exclude most of the experienced facts of life and humanity from the world it described. The narrow abstract world of 19th century scientific dogmatism was indeed a world alien to most human interests. We can to-day begin to hope for the first time that physics itself has reached concepts adequate to render even life intelligible, and that the dream of the scientific mind, to answer every problem of explanation in scientific terms, is measurably nearer of realization.

To devise an adequate philosophy of science is one of the major tasks of modern thought. Although physics has already felt the influence of the concepts that have been developed in the sciences of life, there is still need for a more thoroughgoing synthesis between the method and assumptions of physics and of biology. The two dominant currents in contemporary philosophy differ over what science shall furnish the basic categories and procedures. On the one hand, thinkers starting from mathematics and mathematical physics emphasize the logical structure of the universe, infinitely more complex than the simple Newtonian order of nature, to be sure, but still conceived in rather static terms. On the other hand, thinkers starting from the biological and social sciences tend rather to emphasize the ongoing processes of nature, the emergence of novel ways of being, the genuine creativity of the life of the universe. Both groups are approaching each other; the biological philosophers are coming to admit the importance of the structural

elements of every process, while the mathematical thinkers have so enlarged and complicated their pluralistic, organic structure that it can claim to serve as an adequate description of the rich variety of natural processes. What issue is left hinges chiefly upon the interpretation of the potentiality resident in the universe. Are the complicated wholes with which actual experience deals all implicitly contained in the simple elements which analysis reveals, or does their development imply genuine novelty and creation? Is the peculiar organization of chemical processes that constitutes life, for example, wholly exhausted in the behavior of atoms or electrons, or is that organization an additional datum not capable of derivation from the observed behavior of inorganic elements? The issue seems to resolve itself into a choice of languages; for while no man can maintain the existence of pure potentiality, that is, of processes capable of assuming any structure whatever, similarly no man can deny the fact of novelty in the appearance of complex wholes, however much he may claim that those wholes were potentially present in their uncombined elements. Bricks can build houses that must remain within the limits set by the nature of bricks and gravitation; but in the completed edifice there is an indefinite range of variety and beauty that certainly was not actually resident in the isolated bricks. The very return to this Aristotelian category of potentiality is an indication of concepts which biological facts have forced on the older mechanical science of Newton.

Such theoretical considerations, of course, are the concern of but a tiny minority of those influenced by scientific thought. Indeed, the whole breakdown of

the mechanistic science of the 19th century, and its transformation under the influence of concepts forced on us by biological and electrical facts, has as yet had no effect on the minds of the vast majority who consciously or unconsciously accept the sheer authority of science. The only observable reaction to such pronouncements as that science is no longer materialistic, no longer even believes in matter in the traditional sense, is the comfortable feeling that the Apostles' Creed or the Westminster Confession is therefore vindicated, an obvious *non sequitur*. It is true that contemporary scientific theories take much more account of the great human interests of religion, morality, and artistic creation, and paint a world in which they have an intelligible place. But the very fact that the scientist has developed methods for dealing scientifically with such concerns makes the unchanged adherence to traditional ideas in these fields all the more impossible. Science no longer is content with the obviously insufficient dismissal of human experience as impossible; it is beginning to explain it. Let traditionalists beware!

The net outcome of a century of eager investigation and formulation has been a momentous growth of the faith in scientific habits of procedure and testing. The mass of those to whom Science with a capital "S" speaks with the same authority as the Church of old have, to be sure, little enough acquaintance with the temper of mind that leads to scientific discovery. The great army of subordinate laboratory workers and engineers themselves rarely catch more than a glimpse of the attitude of the genuine scientist. That temper of mind is tentative, cautious, hypothetical. It realizes the limitations of all human knowledge, the mass of

assumptions on which scientific investigation proceeds. It believes nothing as unalterable truth; rather it knows the data and evidence on which each generalization rests, and weighing one against another, fixes tentatively on the theory that can best pass the rigorous tests of scientific verification, until another better one has been formulated. It has the daring to question the most time-honored ideas, and the imagination to envisage better alternatives. In all probability only a small proportion of even the educated class can ever hope to understand such a scientific spirit. For the vast majority, science has become, and will remain, a new authority. Now that scientific theory has abandoned the simple ideas which made possible the wide spread of Newtonian mechanics, any real understanding of science will doubtless grow more and more esoteric, the possession of a small body of trained experts. The rest of us will accept their pronouncements, their dogmatisms as well as their insights, as long as they serve our mechanical civilization. We still linger on with fragmentary and confused scraps of the speculative dogmas of 19th century science, long since abandoned by the scientists themselves. So unnatural is the scientific habit of thought, so great a wrench does it imply with all accustomed and traditional ways of thinking, so difficult an achievement is its acquisition, that even a serious attempt at giving children a genuinely scientific education would not make it popular.

Nevertheless, certain rudimentary tenets of the scientific faith have already entered into our daily lives. Men used to pray for rain; now they hire a rainmaker with his machines. So far have the mechanical tech-

niques of science carried us. It would not even occur to us to pray for relief from traffic congestion, or from municipal corruption. The order of nature, the uniformity of natural law, the reign of cause and effect, —these things we have come to accept. We have not got so far as to demand evidence before we believe; belief is still the most natural state of the human mind, and doubt the most appalling. But when we do ask for evidence, we are not content with the deliverances of authority or inner conviction. We demand something more concrete, something we can see and verify with our own eyes. Hence we believe the pictures we see in the tabloids even when we are suspicious of reporters and propagandists. We have got to be shown. The time may even come when we shall discriminate between the things that are shown us. Something, too, of the experimental attitude has been assimilated. When changed conditions have completely discredited older beliefs, we are willing to try others. We will try anything once, we say; and we calmly proceed to scrap much that a more genuinely scientific experimenter would treat with a little more reverence.

All of these subtle changes over older intellectual attitudes are due, in all probability, far more to the impact of our mechanical environment, itself the indirect fruit of scientific procedure, than to the direct infiltration of scientific ideas. We have acquired what is rather a mechanical than a scientific habit of thought. The boy who loves puttering about with radios and autos and other machines imagines he is destined to be a great scientist. A little experience with the rigorous thinking, the austere asceticism of belief implied in genuine science turns him away. The great majority of

us are just such boys. We have been placed in a new mechanical environment, surrounded by machines, confronted by new problems that impel us to think in terms of mechanical cause and effect. We are impressed by the successful fruits of such an attack on problems. We can understand and admire the engineer, even when the scientist passes our ken. Older methods, natural enough in a world of dependence upon the vagaries of natural forces, or upon purely human relations, seem far less efficient. Our impatience with political procedure is a case in point. The politician's art of governing men has little in common with the methods of mass production. It belongs to the immemorial wisdom of the race; it must be out of date. The garage mechanic can repair a car by methods we have come to appreciate. Why not, therefore, turn to the engineer to govern our cities? Let us put a social engineer, a General Goethals, in charge, with full power to scrap and experiment and be efficient. And all the while we ignore the sheer efficiency in controlling human relations of those organizations, like Tammany Hall or the Philadelphia machine, that have perfected the ancient non-mechanical techniques of the Greeks whose theory we so much admire.

Pre-mechanical methods and interests appear increasingly irrelevant in the machine age. They may linger on for generations; they may even assume a hectic and unnatural importance as refuges from the machine. But they seem more and more divorced from the essential texture of our life. When they are too strong to disappear, they are themselves often strangely mechanized. There are thousands who listen nightly to music broadcast over the radio who find the

European custom of spending the evening in the square listening to the band incomprehensible. The movies have an appeal the stage is losing. Recently a group of pious souls gathered to hear an illustrated lecture on the Holy Land for the benefit of their church. Their interest in following the footsteps of the Master was apathetic; but as one man they were all ears when the lecturer told about the Buicks and the Hudsons in which he traveled and the customs of Arab drivers.

In comparison with these indirect effects of science through its creation of a mechanical environment, the direct influence of scientific ideas has been far smaller. For the most part they have served to justify notions primarily the product of the new social conditions. The notion of mechanistic determinism, that human life is the prey of forces beyond man's control, has won considerable vogue and attained much philosophic respectability. Yet it is doubtful whether men have been led to such conclusions as much by the basic assumption of scientific methodology as by the observation of the child of the slums who grows up to join inevitably a criminal gang. The idea of evolution is congenial to a whole new set of values. What appears at the end of a process is more complex, more highly elaborated, and therefore supposedly superior to the simpler beginnings. But our contemporary worship of modernity, of what is up-to-date and progressive, our sneers at what is outworn, traditional, mediæval, or Victorian, owe far more to the rapid multiplication of inventions promising material comfort than to any scientific concept. We judge civilizations by their plumbing, not their biology or physics. The evolutionary theory has also been widely blamed

for the breakdown of traditional moral ideas of right and duty. In teaching men that they are but highly developed animals, it has removed every incentive,—so it is argued,—for a life devoted to other than animal ends. How can men who regard themselves as descendants of apes seek other than the gratification of their impulses? How can they avoid putting pleasure as their highest goal, and seeking comforts, thrills, and sensual satisfactions above all else? Modern biological notions have been often enough appealed to to justify just such a way of life; but to attribute causal efficacy to them is to give scientific ideas an influence they do not possess. The undoubted spread of a pleasure economy, the preoccupation with material enjoyment, with comfort and luxury, is rather the inevitable result of the mechanical multiplication of the means of living. It is the first reaction to material prosperity whenever it succeeds a frugal past; and the machine has given us a surplus of wealth and leisure never before dreamed of.

On a more intellectual level, however, 19th century science has subtly influenced habits of thinking in ways that cannot help but conflict with tradition. Where the emphasis in the Newtonian age was placed on system and order, that of to-day is far more on investigation and discovery. Not even the sweeping generalizations of two generations back, when the idea of evolution captured men's imaginations as the last of the great Romantic faiths, are in close touch with contemporary scientific interests. Men have ceased to stand intoxicated by the spectacle of cosmic development; they have advanced to a detailed causal analysis of the process of change. They are too immersed in

the wealth of specific facts, in physics as in economics, to bother much about any system, any synthesis or unification of knowledge. The present findings of science, the most recent theories that have been formulated to fit the data at present discovered, have taken the place of Truth, even of the older Laws of Nature. All generalizations are viewed with a deep mistrust. They no longer represent for us the structure of the universe; they are merely the most fruitful intellectual instruments of investigation that will lead to further facts.

The creation of a biological and social science has made it natural to think in terms of psychological and anthropological concepts and attitudes. Man has become for us primarily an organism reacting to and acting upon a social and physical environment. We think easily of ideas and institutions as social products of definite historical conditions, functioning in social groups, springing from the necessity of some adaptation to a material environment. We no longer ask our friend what he thinks to be true; we inquire as to his reactions. Whereas the 18th century, for example, thought of religion and theology as a deductive set of scientific propositions, we now think of religion as a social function, as a way of life springing from the social organization of man's religious experiences, and of theology as a rationalization of fundamental emotions and feelings of human nature. We no longer demonstrate the existence of a creator; we investigate the "meaning of God in human experience." We no longer prove the doctrine of personal survival; we examine the effect of the belief in immortality on human behavior. For us, Truth has given way to be-

liefs that are held on certain evidence; ideas have been subordinated to activities.

Experimental science and the techniques of application that have come from it have sent us back to the spirit of Bacon, to the humanistic faith of the Renaissance in the dignity and power of man. Where the Age of Reason was lost in admiration before the Order of Nature with which man must not presume to interfere, our laboratories and factories have emphasized the part that man can play in altering his own life. We are impressed neither by an immutable order of nature, nor by an inevitable evolutionary process. We have discovered too many specific causes that produce specific results, and too many techniques of manipulation. We realize that society and civilization is ceaselessly changing; we dare to hope that in our science we possess a tool for its intelligent guidance. Science is no longer for us the revelation of a divine order; it is a human instrument for effecting social aims. The scientist is for us not the prophet of the Most High, but the engineer whose knowledge can be bent to the furtherance of the ends of human life.

Yet at the very moment that our scientific techniques have won us something at least of this power over our own destinies, we find that our philosophers are growing more and more doubtful of the validity of human intelligence. Biological and psychological attitudes have reinforced the very irrationalism they arose to combat. What becomes of truth and of science itself, if beliefs are mere instruments of adaptation to an environment? Scientific truths are far different from the absolute knowledge, the immutable and eternal Truth of the older rationalists. They are the best interpre-

tations of the facts of experience that have so far been discovered; they will in their turn give way to more exact and fruitful theories. Moreover, we have already penetrated far enough into the recesses of the human mind to discover all the irrational elements that determine its thought and action. It often seems that amid the play of confused impulse, habit, and emotion, there is no room left for any reason or guiding intelligence. Are not all our beliefs but more or less concealed rationalizations, the reasons we invent for believing what we are forced to believe? Can intelligence do more than invent such plausible justifications for fundamentally irrational behavior? Is not our science itself, that so proudly boasts of being the best human insight into the secrets of the world, but the lore that has grown up in a society enslaved to the machine? Will not future generations marvel at the curious mechanical superstitions of our age?

Such questions point to still unsolved difficulties in our philosophy of science. In making truth a certain value that attaches to beliefs, they demand a formulation of our system of values that we are as yet in no position to undertake. Yet this very doubt of science itself is a part of the confusion that attends our changing civilization. It is expressed by those to whom the new world is still strange and disquieting. It may well prove that in the ultimate record of human history, our boasted natural science will receive a place no higher and no lower than the Aristotelian wisdom of the Middle Ages, or the imposing systems of thought elaborated by the Chinese and the Hindus. To evaluate the ultimate standards of truth requires a still more ultimate ideal of life. What ours shall be-

come, when our traditional Hebrew-Christian conception of the good life has been reconstructed, it is too early yet to inquire; that it will include the mastery of nature and the control of social forces through applied intelligence is beyond question. To ask for absolute certainty, eternal truth that cannot be called to account, is to demand something that our civilization has abandoned, for the present at least. It is to do violence to the very spirit of scientific thought, which for all its inadequacies is still the best instrument the mind of man has forged for the attainment of the kind of life which it dares to consider good.

X

THE CITY, THE LABORATORY, AND RELIGIOUS FAITH

The 18th century made the first real attempt to adjust the older institutions of European society to the demands of business and science. These compromises, so revolutionary to contemporaries, provoked a vigorous reaction. The 19th century was ushered in amidst an atmosphere of bitter conflict between the old world, still strong in the countryside and the almost untouched provincial towns of Germany and France, and the new, already rooted in the cities. But the steady advance of science, extending and consolidating its empire, coupled with the transformation of the commercial life of the 18th century cities under the magic touch of the machine, turned the scales definitely against those who sought to preserve their old ideas and ways unaltered. As the city spread its sway over men's lives and the laboratory over their minds, all the time-honored institutions were placed on the defensive. With discovery following discovery and invention invention, they were forced to beat a steady retreat that in the last generation has turned to a rout. Religion, already profoundly stirred by its earlier encounter with Newtonian science, now found itself involved in what many thought a death-grapple with the spreading faith in science, in a struggle fought on the unaccustomed and alien field of city life. Art

seemed caught in the stifling coils of mass production, and retreated to a remote refuge above the battle. The great ideal of liberty, for which men had bled in their escape from the Middle Ages, found itself discredited in theory and denied in practice. And to-day it is growing clear that the very core of the old civilization, the great Hebrew-Christian moral tradition built up about family life, is face to face, if not with dissolution, at least with the need for profound reconstruction. When the history of the past hundred years comes to be written in a true perspective, these great conflicts will overshadow Gettysburg, Sedan, or the Marne.

The war upon the old civilization opened with the assault of the scientific faith upon the religious tradition. This was an old battleground, where skirmishes had been won and lost by both sides since the 17th century. The initial successes of rationalism in the Age of Enlightenment had led to overconfidence and serious reverses. The philosophers who like Voltaire and Tom Paine had banished all but the core of rational morality in the Christian tradition, had lost. The masses of men, bidden to choose between the narrow science of the Age of Reason, and the rich religious tradition, had chosen Catholicism or Methodism. Penetrating critics like Kant had come to their support, and forced the scientists to recognize the many stretches of human experience which they had no right to deny just because they could not as yet comprehend. Outwardly there seemed to exist a truce. Most men had felt the great revivals of traditional religion that marked the first years of the century. The keenest minds were convinced that religious realities were as

enduring as scientific truth. The philosophers were no longer assailing religion; they were trying to understand the enlarged world of science in terms of what was ultimately a religious view of the universe. The chastened scientists had learned the folly of scorning whatever in the religious life fell short of the logic of Euclid or Newtonian mechanics. They no longer claimed to possess the only revelation. Their task was to be the humble description of facts. Others, were they so minded, might freely concern themselves with reality and the eternal verities.

This truce was broken by two groups of men. The camp of the faithful was betrayed from within and assailed from without. The more intelligent of those who had vindicated the rights of the religious life sought to understand it as well. The great Tübingen school of theologians brought to the attempt the very tools of scientific inquiry whose application in mechanics had already proved so successful. If Newtonian science was too narrow, it must be extended to take account of the most important of human experiences. The great romanticists who felt so keenly the inadequacies of 18th century rationalism, like Herder and Niebuhr and Ranke and Baur, were the very men who laid the foundations of a scientific treatment of human history and human institutions. Inspired with deep religious faith themselves, such scholars undertook a careful study of the history of the great religions, a critical examination of their sacred writings, and an investigation of the religious practices of more primitive peoples. The facts they brought to light attracted the attention of an increasing number of disinterested students.

These sober inquiries proved soon to be more dangerous to a literal-minded belief in the Book of Genesis and the Apostles' Creed than all the jesting and uncomprehending antagonism of a Voltaire or a Tom Paine. Such scholars did not mock at religion; they treated it with sympathy and insight. They did not even criticise it; they merely sought to explain it. More and more they fell into the habit of regarding the old faiths as purely human achievements. With indefatigable industry biblical critics made clear the contradictions and repeated editorial revisions of the Scriptures. Church historians brought to light the very human passions and intelligence written into the great creeds. Students of other religions showed how similar had been the history of all the historic faiths. Anthropologists paralleled the most sacred mysteries of Christianity with myths from Oriental or Indian tribes. Psychologists began to compare the experience of conversion with the effects of alcohol and other drugs.

All the while such scholars were studying the religious life itself, natural scientists were swiftly and surely consolidating their hold upon the hitherto unexplained problems of nature. Geologists were tracing a history of the earth that seemed to reduce the Book of Genesis to the realm of poetic folklore. Biologists were beginning to understand the functioning of life, and finally daring to sponsor an explanation of man's ancestry that had no place for Adam and Eve. As the great religious revivals spent their force, and as the startling ideas of evolutionary science gained a hearing, men suddenly awoke to realize that the clash between the Jewish-Christian world and the new scientific universe could no longer be avoided merely by ignoring

science. The warfare between traditional theology and the scientific faith had broken out anew.

Of these two factors, the application of scientific methods to the religious life, and the new biological theories, it was the former that most seriously shook men's confidence. For it stood for the triumph of the scientific spirit within religion itself. It meant that no longer could the devout retire into their fastness and leave the faith in science behind for those in another realm. Religious facts were to be judged by the standards of the critical investigator, not by those of unwavering belief. When once such a spirit had gained a foothold, bringing with it in so-called "liberal theologies" the inevitable reconstruction of traditional attitudes, it was a secondary matter to mark the new findings of natural science. The breach had been made; there was no stopping the flood of scientific theory pouring in wave after wave.

By 1859 the time was ripe for a rebirth of the faith in science. That Darwin's name and theory came to furnish a standard and a rallying cry was largely an accident. Ironically enough, the theory of evolution is of all 19th century scientific ideas the easiest to fit into a religious interpretation of the world. It was used to good purpose by hosts of men as a scientific support for religious faith. In itself, it has proved far more of a bulwark than a stumbling-block to the will to believe. It undeniably points to a meaning and significance running through all life. It is the one great scientific theory that has stood firmly against any picture of the world as a mere machine. The concepts of time, function, and organization bound up with it have to-day destroyed the narrow mechanistic dogmas

of 19th century physics. Yet for two generations it has been the symbol of the scientific faith; and as such, it has served as the revolutionary idea transforming traditional religious beliefs. Accept evolution, and you accept the scientific method and spirit. Accept that, and you are committed to a series of assumptions with which it is almost impossible to reconcile the basic attitudes of the faith of the fathers. Evolution has been the fatal gateway leading into the new scientific universe.

The men of the mid-century felt this. For them the faith in science had become once more a living reality in genuine conflict with their religious faith. All the old problems of the 18th century came back again, all the old doubts that had been raised since the days of Lucretius. Committed to a religious foundation for their lives, awed by the rapidly growing prestige of science, even within religion itself, it is little wonder that thinker after thinker attacked the problem of "harmonizing religion and science." What sort of Creator could work for long ages through the process of evolution? How could the Ten Commandments rise out of a past of tribal taboos? What became of the mystery of the Incarnation? What was the psychology of grace? It was natural that new interpretations of the rôle of religion in the light of the renewed trust in science should appear a necessary task. To work out some compromise faith that could justify itself in the laboratory became the almost exclusive philosophical problem of the century, to the neglect of more deep-seated conflicts with the new world. The search for God, or a substitute just as good, colored the thought of the entire age. Even poets and novelists stretched

lame hands of faith through page after page, lucky if at the end they could, however faintly, still trust the larger hope.

The still recent evangelical revivals had given the problem peculiar insistence. For all men's interests and ideas were through them more deeply bound up with the acceptance of a religious view of the universe than at any previous time since the 13th century. Men had just tried to reorganize their beliefs, shaken by Newtonian science, around religious faith once more; and now the science of the 19th century was even more surely undermining that renewed faith. It is impossible to overestimate the importance of this cardinal fact. It led men to face the new discoveries, not with the confident hope of the age of reason in the beneficent order of nature, but as men with everything to lose and little to gain. Hence instead of welcoming the triumphs of science as the promise of a richer life for man, they sighed dolefully, "How sweet to have a common faith!" Frantically they sought either to bolster up the faith of their childhood or to find another in the world science was disclosing. They so much wanted to believe in God that they grasped at any straw. God was the Unknowable, God was Force, God was Ether, God was Evolution—somewhere, in some scientific or pseudo-scientific concept, lurked the Father of mankind, still watching o'er his own.

It was not the mere persistence of accepted ideas that made the conflict so bitter. Even religious conceptions can change under the impact of new conditions without too much wrenching, as they have again and again. It was rather that these particular beliefs had just been made the corner-stone of an entire culture.

Men wanted to go on believing in God because the long tradition of Christendom, reaffirmed by romantic poets and thinkers, had made every social habit God's to command, every moral action God's to reward, every aspiration God's to fulfill. Make the idea of a great Being watching over man from his throne, rewarding him, punishing him, assisting him, unnecessary to the economy of the universe, as science was rapidly doing, and the entire structure of customs and moral incentives falls to pieces. Men were unable to order their lives without this cohesive force. They could not conceive a life led wisely amidst the bounties of nature without a God to record their aspirations and forbid their sins. It was intolerable to be suddenly left alone in the universe without a Friend who cared.

It was not the theory of evolution and man's animal origin that furnished the most serious problems, save as they stood as the symbol of the scientific faith. It was rather the fundamental dogmas of that faith itself. These dogmas were not new; they had lain at the basis of the scientific attitude and method since the 17th century. The Age of Reason too had believed that truth must be verified by observation, that complex activities are to be explained in terms of their elements rather than their goals, that there is a reign of universal law that brooks no interference. With the increasing prestige of science, however, with the obvious success of these principles, men could no longer ignore them. They now served to organize a vast body of facts that could not be gainsaid. In 19th century science these principles of investigation took the form of sweeping generalizations—the conservation of energy, the laws of thermodynamics, natural selection,

the mechanistic theory of life. The laboratory had not yet brought to light so many facts that no generalization could embrace them all. The recent breakdown of our traditional physical theory, that is to-day casting doubt on all these 19th century dogmas of science, and leading to extreme caution whenever we advance beyond definite observation, had not yet taken place. The idea that all such general statements are leading principles of scientific investigation, instruments for guiding inquiry rather than laws governing the universe, received little support from enthusiastic scientists. The most speculative generalizations, like the conservation of energy, those which subsequent research has either abandoned or greatly modified, were naturally just those seized upon to complete the scientific picture of the universe. Although 19th century science was vastly richer than Newtonian mechanics, it still clung to much the same fundamental assumption of a closed mechanical and material order. Revolutionary as many of its theories seemed, they are separated by a greater gulf from the more cautious, tentative, and rigorously experimental science of to-day than from the crude and simple systems of the 17th century. Though their data were multiplying, the physics and biology of that day had not yet broken the Newtonian framework asunder. It was this framework, these dogmas and assumptions, that were then the backbone of the scientific faith. It was with them that shaken believers felt they must come to terms.

Deepest of all the old Christian beliefs was the faith in the permanence of the human spirit. There were soon found plenty of substitutes for the Christian God; but science could throw no light on the old question,

"If a man die shall he live again?" Immortality could of course not be disproved. Yet for one who accepted the scientific faith it proved increasingly difficult to believe in a future life. Scientists dislike unverifiable hypotheses. Think of man as a complex organization of protoplasm, of his mind as a carefully built up set of habits and impulses, and there is little place left for a deathless spirit in his frame. Indeed, belief in personal survival was the first of the old doctrines that seemed to go by the board. For a time such doubters satisfied their craving for permanence in the prospect of an unlimited advance for human society. But no sooner had our fathers come to stake all on the continuance of earthly progress, than new—and to us highly speculative—generalizations of the physicists robbed them of this hope too. In the nineties the second law of thermodynamics, which seemed to prophesy an inevitable cooling off of the solar system and the ultimate extinction of life upon our planet, drove many a sensitive soul to complete despair. How could life be worth living were it fated that of all this eager striving nothing will remain? Then radium was discovered, and the earth was doomed to go up in smoke.

No wonder the new universe was painted as an alien world in which man could never feel at home. A final tenet of the scientific faith sketched in still blacker shadows. From the 17th century onward, scientists had built upon the conviction that in the order of nature every event is caught up in the working of immutable law. A completed science, it was affirmed, could predict the course of every drop of water in a storm at sea, and equally every action, every emotion felt in a social

revolution. At this fatalism the romanticists had rebelled, but scientists could not so easily surrender their basic faith. Now that men were learning something of the causes that determine the action of man's body and even of his mind, now that the thyroid gland was invoked to explain Napoleon's career and the hookworm the backwardness of the Georgia cracker, the old problem came to the fore again. Are we entirely determined by the circumstances in which we are placed, or are we free in some measure to rise above them? In this age of psychology, experimental and Freudian, are we masters even of our souls?

Whole generations have not shrunk before the religious fatalism of St. Augustine and Calvin. If one truly worships God it can be a fierce joy to be predestined to do his will. Even damnation can be faced if it is the decree of the All Good. But this new scientific determinism proclaimed that man's every act is governed, not by an all-wise providence, but by an alien, inhuman, callously indifferent Nature—"Nature red in tooth and claw," cried those impressed by the bloody struggle for existence. Man was not even the tragic hero upon whom the gods wreaked destruction. He was but a crawling worm upon the cosmic stage. Dramatists and novelists, Ibsen and Hauptmann, Hardy and Galsworthy, were quick to seize the theme of the weak figure caught in the toils of an unfavorable environment, or the victim of an inescapable heredity. To be sure, the new doctrine, in the hands of a Clarence Darrow, as of old in Spinoza, promised understanding and pitying forgiveness; knowing why a murderer had to kill, one could hardly take vengeance. But for those who felt themselves cast in such

a rôle, the contrast with the old assurance of God's loving providence was appalling.

The denial of personal immortality, the prediction of the ultimate extinction of the human race, the negation of moral freedom—these were the consequences which seemed to follow logically from the fundamental assumptions of the scientific faith. It was these points of conflict with traditional hopes that seemed most serious to the thoughtful men who really understood the claims of science. They exercised a strange fascination over the literature of the eighties and nineties, and upon those intellectually sensitive to ideas. Anatole France, Renan, Hardy, William James, are full of them; even Mark Twain succumbed. But it was after all only the educated minority who felt the full insistence of what science meant to the beliefs they cherished. Most men long failed to realize the import of the new ideas. The growth of scientific knowledge, indeed, went on apace with little immediate effect on the strong religious interests the masses had inherited from the recent revivals. Only the more thoughtful were aware of the gulf separating the old Christian universe from the new kingdom of science. Most of us even to-day, in fact, measuring science only by its fruits in invention and mechanical appliance, can ride to church in a Ford, tune in by radio on some evangelist, or see the latest movie of the Ten Commandments, with no thought of incongruity.

So persistent, in truth, are old ways of thought, especially when connected with the deepest emotional habits, that there need be no incompatibility between a strong interest in traditional religion and the wholehearted acceptance of scientific knowledge. If the de-

sire be deep enough, it is even quite possible to resolve satisfactorily any logical conflict that may seem to yawn between scientific theories and the faith of our fathers. Many subtle minds have effected such a logical solution. Many more have been like Pasteur or Mendel quite content to entertain without question the imaginative beliefs of the authors of the Pentateuch side by side with the exact formulations of recent investigators. Multitudes of Catholics have been able to rest with intellectual satisfaction in the comfortable doctrine of St. Thomas, that between true science and true religion there can be no conflict, since both spring from God.

It is even possible for an active faith in science, and the scientific spirit of patient investigation and testing, to dwell in the same mind with profound religious faith. Orthodox Christians, Catholics and Protestants alike, were among the 19th century scientific pioneers. But such an active scientific faith is undeniably more disturbing than the mere passive willingness to accept the discoveries of others. It brings with it new attitudes and new loyalties. It is bound to bring also new feelings toward the religious life. Where such a scientific faith has attained real strength, it may easily obscure, not only traditional belief, but even all religious interest whatever.

During the last few generations the rapid growth of such an attitude among the educated classes has undeniably weakened the old faith of the fathers. It is a subtle and devious process by which one faith thus gives way to another. Certainly logical argument, refutation and disproof, play little part in it. Far more important is the steady piling up of new habits of

thought to which the old beliefs are irrelevant. You cannot convince a Byran that there are any inconsistencies in Genesis. But work for years with old manuscripts and texts, comparing versions, noting differences in style and spirit, seeing the manifest results of repeated revisions. If you then turn to the Old Testament, you simply cannot believe in the literal inspiration of a writing that bears all these earmarks of human origin. You cannot absorb the critical spirit of the laboratory, grow accustomed to balancing rival hypotheses, test again and again every conclusion, continually modify your statements as new data pour in, and still believe any doctrine or church merely because it claims to be the final truth. You cannot live with machines, pull levers and turn switches, and retain your naïve trust in prayer or magic. The early investigators who remained pillars of the church found it easier than we to entertain two faiths at once. They were still living in the old world, still feeling the strong religious currents of their day, still buttressed by the homogeneity of public opinion. Such a feat has become increasingly difficult for men who have grown up in the city amid the laboratories and the factories, without ever having really felt the pull of the old.

Faced by the richness of the old tradition and the promise of the new, many sensitive thinkers were driven to reinterpret the historic doctrines in terms of the theories of the laboratory. These 19th century philosophies accomplished a most essential task in easing the transition to the new world. For many a wavering soul they prevented the too reckless abandonment of a precious heritage. In an age of narrow scientific dogmatism they kept alive much that our

present-day science is glad to welcome. But as we look back to-day it is now clear to us that they were at best compromises, earnest attempts to merge the religious loyalties of the past with the new trust in science. They were really new forms of religious faith. They tried to fit the popular scientific concepts into the framework of the traditional moral idealism of Christendom. Was not the majesty of scientific law the true miracle? Was not the progressive moral insight of the Hebrew people the true revelation? Were not the nobility and fervor of the Prophets divinely inspired? Was it not eternal life to contemplate truth? Were not the simplicity and beauty of the Sermon on the Mount essentially divine? Above all, was not a God who worked as the indwelling force lifting evolution onward and upward, a God who appeared as the undying fire in the hearts of men, urging them to strive for all that is best, more worthy of worship than the jealous tyrant who walked in a garden, cursed man for eating an apple, and bathed in blood those who dared oppose his handful of chosen peoples? For such gropers the idea of evolution proved a godsend. Did it not proclaim there is a purpose in the world, man's ideals do matter to nature, heaven in substantial form will be reached on earth? Evolution was eagerly grasped as the scientific substitute for the Christian providence; it came to play the leading rôle in the new philosophies. Because of its religious appeal it won a far larger place than its strictly scientific significance seems on sober reconsideration to warrant. The ultimately important result of Darwin's work, the biological conception of human nature, was for

fifty years obscured by this turning of evolution into a new religion.

Not the bleak despair of the scientific dogmatists, but such compromise evolutionary faiths, proved during the last generation of the 19th century the most successful antagonists of traditional Christianity. This had been true in the time of Herder and Goethe and Hegel; it remained true during the popularity of Herbert Spencer, Comte, and Haeckel, and down to the days of Bergson. Such faiths retained the old religious fervor, they emphasized the essentials of the religious view of the world, and yet they used the language of the new science. Their fine zeal left hardly a writer of note or a thoughtful mind untouched. By the eighties and nineties disturbed theologians were tired of the losing tactics of beating a steady retreat before the Huxleys and the Ingersolls. To them these 19th century evolutionary philosophies came as a welcome alternative. They found the German compromises, especially those of Schleiermacher, Ritschl, and Hegel, the most congenial, for the German evolutionary philosophies were thoroughly colored by the great romantic formulations of religious faith. From German sources these philosophies were carried to England and America to become the basis of what passes in liberal religious circles for "modern theology." For a generation they have served as transitional faiths. They have enabled the more thoughtful of those still attached to the traditional churches to combine old and new loyalties. They are to this day the salvation of men just awakening to the scientific world.

The second half of the 19th century was deeply

troubled by this problem of religious compromise. Most of its intellectual formulations and philosophies started out, not with the desire to understand the structure of science, but to find a place in it for religious conviction. It was but yesterday that a few isolated thinkers resolved to take seriously the inquiring, investigating, critical, testing spirit in which scientific thinking is carried on, and to make it the basis of a genuinely scientific philosophy. For them, there was no lost faith to be recovered in another form; they had grown up in the age of science. For them, there was no passionate struggle between the religious tradition and an alien world; as a matter of course they felt emotionally at home in the world into which they had been born. They looked upon the religious tradition as its natural outgrowth, to be understood and appreciated like any other natural phenomenon, not to be zealously defended or bitterly attacked. They felt free to work out a religious faith within the framework of the natural world, just because they were not emotionally called upon to justify a faith in religion as a whole. Yet as they surveyed the modern scene, it seemed as impossible for an intelligent man to believe literally in the mysteries of Christianity as in the gods and oracles of the ancient Greeks. Both they found intensely interesting, marvelous expressions of human genius at its best, yet both belonged to worlds that for them had disappeared. Eagerly they asked, what new form will religious faith assume in a world that recognizes the scientific method as the only guarantee of truth? It is this attitude of theirs, sprung from a hearty and untroubled acceptance of the new world, scornful of the

compromises of the 19th century because they feel no need to compromise, this naturalistic welcome of the spirit and the fruits of the laboratory, that colors to-day the thought of those who have never had to struggle against science. And while it claims a sympathetic insight into the religious life, rightly viewed, it sounds for those who share it the death knell of the more traditional forms of Christianity.

In these divers ways men have managed to adjust their minds to the faith of science. The process is so recent, and so dependent upon an elaborate reëducation, that we can still see about us all the stages of the transition. There are, first, the compact groups that set their faces resolutely against any contamination by this snare of the devil. Of these, some in sheer ignorance of the meaning of science protest in anger against its catch-words. Such are most of the Fundamentalists who see in Darwin the symbol of all that is assailing their familiar world, and imagine that to delete "evolution" from the textbooks would arrest the disintegration. Some, realizing that the slightest breach in the walls of the time-honored doctrines will let in the flood, brook no compromise with even the most apologetic of the new philosophies. Such is the Catholic Church, willing enough to use science within bounds, but swift to condemn any attempt to "harmonize" it with religion, and engaged in a vigorous counter-attack by reviving the best thought of the old world, the Aristotelian philosophy of St. Thomas. To the more thoughtful of our cultural conservatives science is the foundation of the whole new civilization they fear and detest. Some may even like Gandhi condemn the hospital as the entering wedge of the factory.

The oft-told story is being repeated once more. Every new force that has come into our civilization in the past has always provoked just such bitter hostility. Christianity itself had to meet it, and so did the Greek thought rediscovered in the Middle Ages. But in addition to the determined groups of conservatives, there has always been a growing number of mediators. While still feeling the strong appeal of the well-tried ways and the familiar beliefs, they are yet unwilling to reject the promise of further truth. By the second or third generation these mediators form the majority. It is their compromise that smooths the path of eventual change. This mediating rôle is filled to-day by the religious liberals and modernists, men who, cherishing the old forms and feeling the warm emotional pull of their childhood faith, insist all the same on assimilating what they can absorb of the newer currents. It was these men who during the 19th century welcomed the elaborate attempts to pour new wine into old bottles, the theological "reinterpretations" that gave new glossaries for old creeds. They turned first to the revised theologies worked out by the German idealistic philosophers. With the vogue of Darwin they reclothed them in evolutionary garments. As the ascent of man replaced original sin, the evolutionary process was made to culminate in Christian morality. So well have the ideas of their noble compromise served to ease troubled minds that to-day liberals are still hesitating before the naturalistic philosophies that make religion the highest manifestation of man's human nature. Thus do old liberalisms turn into present orthodoxies.

It is the liberals of another day, system-builders like

Saint Augustine and Saint Thomas, men who fused what was new for them with the old, who stand out as the great intellectual geniuses of the Christian tradition. It is, in fact, nearly always such mediators and compromisers who shape the ideas of prophets into the enduring forms of intellectual life. But never before have they been confronted by such alien elements to digest. In each new reconstruction since the Reformation Christianity has repeatedly given up more than it could absorb. Does this most recent effort of liberal religion promise a successful adaptation to the age of science, and will there emerge from it a Christian faith that can again satisfy the soul of a saint and the intellect of a scholar? Or does it mark the final abandonment of all that was vital in the long Christian tradition?

Conservatives and mediating liberals are not the only groups. To many of the educated to-day, Christianity in any of its recognized forms seems doomed. For them, science has answered the old questions, and chastened the old hopes. In the age of the laboratory, they think, what faith is left must be a faith, not in God or heaven, or even in abstractions like Right and Justice, but in such things as fall within the recognized domain of science. Not even the ideas that kept alive the fading trust of the last generation make any appeal to them. The worship of evolution or other nebulous scientific concepts seems faintly ridiculous.

A far larger number, wearied of the long vain attempt to reconcile science and theology, without definitely renouncing the beliefs of the past have allowed such intellectual problems to sink into the background. They realize that the 19th century com-

promises have been left behind by modern thought; they are bewildered by our comtemporary scientific philosophies. This retreat from thought is the easier as psychologists and anthropologists are assuring us to-day that religion is after all primarily a consecration of feeling and action, not a matter of thought and explanation at all. Nowadays it is popular to be impatient of all theologies, old and new alike. The religious life that still pulses in the old institutions has turned to other channels.

With this fading of intellectual interest, men have been left with two faiths, the faith in social justice and the faith in beauty. Those for whom orthodoxy is impossible find in religion either a united moral endeavor, the inspiration to social crusades against pressing evils, or else a poetic revery, an escape from a mechanized life into the peace and beauty of a noble imaginative world. In our present-day cities, aside from the unchanging worshipers of tradition, the crowded churches are either those where some prophetic preacher is calling for a more righteous social order, or those where the beauty of music and ritual make the service a satisfying work of art. The gospel of social justice, the gospel of beauty,—it is to these calls that men hearken to-day.

Indeed, for the many for whom the conflict of religion and science has been at last resolved, who either accept science as their world or cease to bother their heads, the religious problem is very different from that which confronted their 19th century fathers. It is no longer a question of how to keep a faith in God and immortality from slipping. It is rather the choice between these two competing gospels. Is it the moral

urge they are to salvage from a dissolving Christianity, or is it the beautiful symbolism of the immemorial ritual? These two religious appeals have in the past been held together by the bonds of doctrinal belief. One church sheltered St. Francis and Giotto, Savonarola and Palestrina, Luther and Bach. But to-day they are drifting farther and farther apart. Those who feel the one all too often have only contempt for the other. One who is ennobled by hearing Bach's masses is not apt to worship with the denouncer of war and the profit-system. Is religion then in the coming age to split into an unimaginative, none too intelligent, and easily discouraged social reform, and a passive, callous, and parasitic enjoyment of the beauties of the past?

Before we can attempt to answer these problems, we must pause to note the effects of the other dominant force of the times upon our religious life. Industrialism and the city have been far more subversive than all the scientific theories put together. While the 19th century was wandering in these intellectual perplexities, a subtler but more serious foe than science was undermining, not mere beliefs, but the very roots of religious feeling. We are all too familiar with theological difficulties. We are apt to overlook the real religious revolution of the past two generations, the gradual crowding of religion into a minor place by the host of secular faiths and interests brought in with city life and industrialism. For every man alienated from the church by the study of biology, there are dozens who, with no intellectual doubts whatever, have found their thoughts and feelings fully occupied with the host of new pursuits and diversions that belong to the

machine age. A century ago the farmer found almost his only interest outside the daily round in religion. To-day the city-dweller faces the far stronger appeal of dozens of others. A truly intelligent Fundamentalist, indeed, would leave biology alone as of little account. He would try instead to abolish the Fords and movies and Sunday newspapers and golf-links that are emptying our churches. The secularization of life that began with the Reformation and before has finally triumphed. For while the earlier commercial society banished religion from business to the one sacred day of the week, modern invention has conquered the Sabbath also.

It is the sheer irrelevance of the old religious life to the world of the city and the factory that has pushed it inevitably into the background. What does it after all matter that earnest men have finally succeeded in combining the old beliefs with the spirit of science, if those beliefs no longer have a vital meaning, are at variance with all that men really care for? The serious conflict in which religion is now engaged is not with science, but with our whole industrial civilization. Stand in the fields, look up to the hills, live amid the rain and the wind and the growing crops, and you naturally feel the religious emotions of humility and awe, reverence and dependence and thanksgiving. Stand in a humming factory; what has this mass of moving iron to do with religion? Where is the very basis of the religious life, those deep emotional experiences from which springs trust in a higher being? There is left only awe before sheer power, might made visible. The traditional feelings are still strong with our generation; how long will it be before men are thrown

back on the most primitive and rudimentary form of religion, the worship of mere might? Perhaps the old emotions will be crowded into the leisure hours. Stand in Times Square at night, watch the hurrying throng bent on pleasure, seeking thrills and emotional debauches to make up for the strain of the daily grind. What has religion to do with this mass of pleasure-worshipers? Christ proclaimed, "Blessed are the meek, for they shall inherit the earth." Where are the meek to-day? Christianity was founded on the sinfulness of pride, and pride has become our supreme virtue, extolled by Chamber of Commerce boosters, by statesmen, by labor leaders. Of old it was written, "Blessed are the pure in heart, for they shall see God." But to-day it stands, "Blessed are they that read the Daily Pornographic, for they shall see Ruth Snyder" —or some other heroine of the latest divorce scandal or murder trial.

Consider how the city has made over in its own image the religion it deigns to keep. Fundamentalist and modernist alike can compete with our rushing life only by jazzing up their own messages. Both hell-fire evangelist and liberal preacher have discovered the drawing power of religious vaudeville and of the spicy sex-stuff. See what has happened to the Man Nobody Knows and the Book Nobody Knows, at the hands of the advertising man everybody knows. Jesus now steps forth as the first publicity man, who put across the best paying proposition in the history of insurance. The Last Supper turns out to have been the first Rotary Club luncheon.

In this bustling world of the city and the loud-speaker, are the old religious needs actually vanishing?

Or are they being satisfied by the many new secular religions that seem the real faiths of to-day? Christianity has as yet failed to assimilate the objects to which our passions are genuinely attached. Not even the most devout can pray that coal-seams be not exhausted, or that pay-envelopes grow heavier, or Fords cheaper, as they still pray that rain may fall and crops flourish. Does the future belong to the religions that are growing up about these our real needs? Already nationalism, the worship of the flag and patriotism, is our strongest and most universal religion. It seems the only faith that can cut across class lines and claim the loyalty of all men. Even Christian churches have been known to attach themselves to its conquering standard to gain strength. Will Britannia or Germania or Uncle Sam supersede our Father in Heaven? He has already become for many just such a tribal god.

Or will working-class creeds, born of the hopes and longings of the lowly that have been so potent in creating religious fervor in the past, sweep over us with all the vigor of new millennial faiths? Does Russia, where portraits of Lenin have replaced the old ikons, hold the religious secret of the future? So closely has organized Christianity become associated with the spirit of the Middle Class that the great mass of the workers have come to feel in existing churches little that fits in with their habits or meets their aspirations. They are little troubled by intellectual doubts; but they find no faith they can understand or share. Where they harbor active antagonism, they turn naturally to such religions as communism, as fierce in its intolerance and fanaticism, as monotonous in its deadly orthodoxy, as ever Christianity was in the days of its crusading zeal.

Surely here is a religion admirably adapted to succeed!

One can well doubt that religious needs will completely vanish in the new world. But the thoughtful observer may indeed ponder whether for the majority they will not find expression in some such secular form. Like patriotism, it may even call itself Christianity, and endeavor to preserve historical continuity with the past. We need not fear lest nothing that can be identified as the religious life will remain. But if it involves a radical break with our existing religious tradition, though it bring new vigor and many fine fruits, as the best of the humanitarian faiths do, it will run the danger of discarding much that men have slowly learned over long generations. Christianity and Judaism are the accumulated heritage of thousands of saints and prophets and scholars and seers. Their discoveries and insights are too precious to be lost. Bereft of their spiritual wisdom, the religion of the future would be thrown back upon the most primitive and uncriticised passions. Much has been won since the days of the Pentateuch that would take generations to recover. At its worst Christianity is immeasurably superior to our primitive nationalisms. It is not enough to rest confident that some form of religion will endure; the quality of that religion is what matters. The danger is that in the shock of meeting the new civilization our religious life will grow worse and not better. New religions are strong and vigorous enough; but though they be called by old and revered names, they can be damnable. No one to-day is wise enough to predict whether Christianity can conquer and assimilate our new world, or whether it will itself be conquered.

So far, of the new faiths not cutting loose entirely

from the past, it is only the gospel of beauty and the gospel of social justice that have met success in adapting themselves to industrialism. The religion of art, the hope of those fleeing from the world of intolerable science, serves also as a ready refuge from all that is hateful and unbearable in industrialism. Religion in the past has been the sure escape from a too bitter reality, the great consolation in the pains of life. It has offered men a heaven where all their needs found satisfaction and all their failings were made whole. Our cynical generation has grown skeptical of all such heavens, be they those of the Almighty Father on his throne or of the Golden Age that is to dawn with the day of revolution. Beauty is for it the one secure rock as yet unassailed by doubts. Will all the throng who seek the consolations of religion take flight from science and mass production to such a world of the imagination, where they can for the moment forget their troubles in communion with the deathless art of the past?

But religion has been not merely a source of consolation. It has been a great call to make all things new. Again and again the prophet has stirred those whom the priest had lulled to dreamy slumber. This need of men for inspiration and courage and the self-reliance to master their fate has been for us embodied in the social gospel. For a generation earnest moral leaders have proclaimed it as the real core of the Christian faith. Christ came, they urge, not to bring resignation, but to call men to action. His message was the building of the Kingdom of God, not the beatitudes. And his Kingdom can be no other than that heaven upon

earth for which men are striving along the paths of social reconstruction. All communions have hearkened to this call to master industrialism, Catholics finding inspiration in the age when the Church did organize the mediæval world, Protestants sharing rather the flaming visions of the early Christians, Jews listening once more to their great social prophets of old. With their genius for organization, Catholics have even in European lands launched strong political parties that advance cautiously to modify the spirit of business enterprise. In divers ways men inspired by the great religious traditions have begun to come to terms with the needs of an industrialized civilization. Sometimes it has been to proclaim the brotherhood of the nations and the beating of swords into ploughshares. Sometimes it has been to crusade against the evils of strong drink. There has been much groping and little success as yet. But the urge is strong to redeem the world.

Will these new versions of past religions hold their own in the city and the laboratory? It is hard to say. It is the fate of the prophet ever to cry in the wilderness. Earnest and high-minded as are our modern John the Baptists, their followers, though devoted, are as yet few. The priests of beauty, too, though multitudes are seeking consolation, are speaking to a society that has divorced beauty from life. They find it hard to reach any but the sensitive souls who have already fled from the present to the past. Neither of these two forms of traditional religious life is to-day as strong as the new secular nationalism or Marxism that own no roots in the pre-industrial age. And it must be confessed that neither the Anti-Saloon League nor the

choir-singing in St. Midas's on Fifth Avenue is particularly inspiring. Are these to be the fruits of the great Christian tradition?

The sheer reactionaries are daily gaining strength from those who see in the religious forms of the past the strongest bulwark against an unfamiliar world. The Catholic Church is growing by leaps and bounds, and will wax even more mighty as men come to realize all that the new civilization holds in store for them. It has the greatest resistance of any of the older institutions; it will gather the hesitant by the millions. Where science dissolved religious orthodoxy, the fear of a mechanized life is for a time strengthening it. But to the thoughtful observer it seems doubtful whether even this Rock of Ages can ultimately withstand the forces let loose by the new civilization. In the near future it seems likely that the mediators will find the task of bringing organized religion into harmony with the needs of the new world too hard for them. Their heroic attempt will not prove popular. Embattled orthodoxy will look from the old civilization across to the purely secular faiths of the new, as in the streets of Moscow to-day the Virgin faces the head of Marx. Yet in the course of changing civilizations it is rare for what has served generation after generation to disappear completely. Eventually our Jewish-Christian heritage will flow into the religious life called forth by the spirit of science and the organization of the machine.

XI

THE CITY, THE LABORATORY, AND ART

In our world art is so much a kind of external adornment put on as a sign of prosperity, so entirely inessential to the important business of living, that we can scarcely realize the natural and vital part it has played in other societies. Hardly a group but has made the commonest objects satisfying to look upon, and planted and harvested, grieved and rejoiced together with song, dance, and ritual. Every culture has handed down standards of excellence in which the craftsman took pride, and elaborate ceremonies performed for sheer joy. To be sure most of them have never been devoted to "art" as a special pursuit, any more than they have set apart a particular domain of life to be called "religion." Like the Greeks, they have had no word for art that meant other than the skilled technique of the craftsman living up to the level of his predecessors. To the Athenian, the art of performing tragedies in honor of Dionysos or of carving marble for Athene was like the art of cobbling or the art of navigation, beautiful in its mastery, satisfying to do well. But whether men were building a shrine for the gods or making garments and household pots, beginning the harvest or recounting the deeds of heroes, with true artistic spirit they displayed a wealth of imagination and a disregard for naked utility, a deep

concern with the technique of their activity and the perfecting of its form.

Nor were these traits isolated and private possessions of peculiar genius; they flourished as part of a culture shared by the whole group in which they were carried on. Whether they were the social arts of religious ritual and dance, or the skill of certain crafts, the people had long understood and appreciated their techniques and forms. The harvest ritual of American Indians, the temples of the Greeks, the mediæval cathedrals, the pottery and sculpture of China, the great heroic epics,—these were essentially products of the life of the group. The men who created them are unknown; they were good workmen. The artistic materials they used were given them by their group heritage,—styles of column, rules of drawing and coloring, legends of the saints and tales of Troy. The emotions they felt and translated into stone or clay or words were the emotions felt by those for whom they builded,—religious adoration, veneration for popular heroes, pity and horror for the workings of fate. The symbols that shadowed forth these feelings were embedded in a great tradition in which all felt at home. The cross, the Virgin, the angel of the annunciation, the cloak of St. Martin, the joy of St. Francis; the bravery of Roland and his great sword, the treacherous faith of Lancelot, the unrecking love of Tristram; the wrath of Hera, the defiance of Prometheus, the guilt of Œdipus and the cleansing of Orestes,—the artist who worked with these themes could not fail to touch spirits soaked from childhood in a tradition that embodied all the loyalties and aspirations of a complete life. From the carved wood of the African negro

to the Parthenon frieze or Greek tragedy of doom, in the great epochs of artistic achievement an entire society shared a rich imaginative world, held common emotional attitudes toward the experiences of life, and possessed a language of symbols to express them that was understood by all.

In such societies the highest genius could find a rich mass of material ready at hand to transmute with its own creative individuality. Yet without an understanding and appreciative audience, without the inherited techniques, above all without the shared emotional experiences to inspire them and lend significance to their forms, what could have come from even a Sophocles or a Phidias, a Dante or a Giotto, a Michelangelo, a Shakespeare, or a Goethe? Now and again an erratic mind like Blake's can create a whole new world of symbols of its own, but it remains an intellectual riddle; we are at a loss to enter it with him and feel its emotional structure and patterns. The supreme art has worked with the feelings and symbols of a great imaginative tradition. Periclean Athens, the Christian 13th century, Medicean Florence, the Elizabethan age, the last backward yearning of the Romanticists, not to go outside our own past,—from these eras of a common faith and a common world of the spirit have come the great masterpieces of individualized genius.

Again and again a like fate has befallen these creative outbursts. Craftsmen have seized the devices of the masters and carried them to even greater heights of technical perfection. But what were living symbols become the mere worn counters, the mere conventions of the craft. The subjects that once were freighted with the deep passion of a communal aspiration decay

into the academic and standardized commonplaces of the schools. The dread divinities of Athens are the sugary gods and nymphs of Alexandria. What individuality and imagination remain are turned toward technical tricks and breath-taking mastery of difficult materials, to the nice balance of periods and the carving of lace from stone. What sprang from the very life of a people becomes "art," a thing apart with no relevance to the world in which men are now feeling and yearning, a mere means for the ostentation of the rich. Thus the sculpture of 5th century Athens, the imaginative incarnation of the very gods, gives way to the writhing Laocoons or the graceful Venuses that adorned the gardens of Hellenistic merchants and officials. The poetic scenes from the Christian epic painted by the 14th and 15th century Florentines pass into the stock madonnas and pietas of a Raphael or an Andrea del Sarto. The living characters of Shakespeare wring their passions to tatters in the melodrama of Beaumont and Fletcher, Ford, and Shirley. The deep insight of a Goethe into all human striving is followed by the attitudinizing of Byron and the blood and thunder romancing of Victor Hugo.

The creative imagination of our own artistic tradition was normally ebbing into the flats of such academic and technical mastery when it first felt the effects of the scientific attitude. So strong had been the impulse of the Renaissance that its forms still carried over into the commercial age of reason. And the new rebirth of the romantic era was already fading when machine production supplanted the old handicrafts. In any case we could hardly have expected more than a silver age for the many forms of art; but the new forces

hastened the breakdown of the creative syntheses and the divorce of art from the currents of life. They seemed indeed utterly to destroy the conditions that made possible the strong artistic traditions of primitive peoples, to say nothing of the waves of communal enterprise from which sprang the personal masterpieces.

In the art that is timeless there is a happy blend of imagination and craftsmanship. The peak of an artistic movement, in fact, is reached before the effortless command of materials has been attained. Now the effect of science upon the artist's enterprise is to emphasize perfection of form at the expense of the imaginative insight that makes form significant and satisfying. It creates a demand for precision, exactitude, and finish. It reveals theoretical laws upon which the working of materials can be based. It substitutes for the chance inspiration of crude methods the studied elaboration of the schoolroom. To men just organizing the techniques of the early Renaissance, the rational spirit of the 17th century brought the vision of scientific rules. Leaders like Leonardo and Michelangelo, as well as hosts of the less inspired, had contributed to art and science alike by their study of perspective, color, geometrical proportion and mechanical engineering. In the Age of Reason teachers and critics drew up elaborate rules for constructing and judging works of art. Palaces and gardens were laid out correctly on the drawing-board; paintings were executed according to the book; plays were written and epics put together with a proper regard for all the laws of poetic structure. For a Boileau, a Pope, or a Palladio, many were the seductive paths to be avoided and narrow the road

of respectable achievement. It was the rational spirit of geometry that dominated the pseudo-classical tradition of the 18th century. In the world of Pope, the prizes went to him who found the one inevitable expression of a commonplace sentiment; there was little room left for originality struggling with new form.

Though the Romanticists broke down these narrow rules and enlarged the bounds of the permissible, their richer palette could not escape the crystallizing power of academic imitation and the permeating scientific attitude. For a century young painters and architects and musicians have not learned their craft by apprenticeship to a master, but in the art schools of Paris and Dresden. Painters have gained their skill by copying the masters in frigid galleries. Sculptors have been required to reproduce plaster casts of classic statues. The pundits frown on all who fail to undergo a long grueling application to the principles of design or the science of counterpoint. The army of craftsmen turned out can be trusted to execute any commission correctly, but their imagination exhausts itself in fragmentary studies. Even the many earnest attempts to explore new forms in painting, verse, or harmony that mark the troubled art of the last generation seem strikingly akin to laboratory experiments. One hopes against hope that some day these men will really master their medium. When will our Matisses and Picassos, our Schönbergs and O'Neils and Joyces, cease playing with their fascinating techniques and find something of real significance to say? The reproach is not altogether just; but it is bred of an impatient thirst for more.

For this preoccupation with craftsmanship science

must answer. It has taken away spontaneous feeling and infected the artist with an interest primarily intellectual. It has made difficult the immemorial human habit of thinking in terms of symbols, of feeling a world of meaning in a simple object or act. In the wealth of traditional symbols of the older societies, the artist had a mine of material and an audience to listen. When he treated Agamemnon or Apollo, Galahad or the Virgin, every man could feel that imaginative world with him. These themes were bound up with a thousand intimate responses. But who can really care about Joyce's Stephen Daedalus or Cézanne's old men playing cards? In them we can at most take a critical, intellectual interest, admiring the mastery of the craftsman with a detached eye; while the symbols with which the great imaginations of the past have dealt have awakened an emotional rather than an intellectual response. Both artist and beholder regard them with the deepest feeling, and the experience of the past shows that craftsmanship and technique alone, divorced from such feeling, have not been able to strike off imperishable form.

These old symbols science has destroyed. It has robbed them of their meaning and left us a few tawdry conventions. Nor has the scientific attitude been able to create new symbols of its own. In the work of the scientist there is an abundance of imaginative insight and profound feeling; but his every instinct is to distrust brilliant suggestion and submit it to the careful test of fact. The achievement of scientific truth has been one long effort at objectivity and impersonality, at disciplining the imagination. Regretfully Darwin tells us how his years of patient investigation de-

stroyed for him the ability to appreciate music or poetry; and as we slowly approach Darwin's frame of mind we too can no longer see the moon as the queen of the night. The Great Bear of the Greeks, the Charles's Wain of the English peasant, has become for us but the prosaic Dipper it actually resembles.

Hence our art has grown objective and impersonal too; it smacks of the clinic or the dissecting room. Our novelists and dramatics analyze the common man to tatters; our poets relentlessly pull apart a passion; our painters seek the form of color in a bowl of apples, or drag the soul from a portrait or a landscape. The critics pour forth volumes on the psychology of beauty; the experimenters try æsthetic theory after theory without pausing to show what the serious practice of one might lead to. But who can approach such materials with the attitude in which the artist of old, be he African idol-carver or learned Dante, came to the great imaginative world in which he worked?

That imaginative world of ours science has taken from us. What have we left? It is already fatal to use the Christian tradition; who could breathe life into another Paradise Lost or a new Inferno? The legends of Greece, faintly revived at the Renaissance, are hidden in yellowing books. The mediæval romances are remote; at most we squeeze from them a sophisticated liqueur. The epic of the atom and the stars, the drama of evolution, are still in the future. And our minds are full, not of the problems of human destiny, but of Buicks and Hudsons and the office and installments on the house.

But if science has destroyed the imaginative and emotional life from which inspiration has sprung in the

past, machine production has done its best to wipe out the basic craftsmanship itself. It is not that the products of the machine are necessarily ugly; indeed, beauty is as easily and as cheaply secured as what we usually get. It is quite possible to reproduce with steel girders and mechanical chisels the glory of a Chartres cathedral, barring the weathering of time. But the craftsmen who built Chartres were artists, and the skilled imitators could not be. The old handworker could feel the material taking shape under his tool; he was in a real sense a discoverer bringing to light the form already implicit in stone or glass. In modern industry the artist, be he never so gifted, be he provided with a wealth of the best models, is a designer; that is, he is an inventor, devising some machine that will apply to an economical material a design drawn from thin air. Between him and his product there is an impenetrable barrier of paper; the stimulus of the actual wood or cloth is never there. The old cabinet-worker let the chair grow out of the very grain of the wood; the Grand Rapids manufacturer can only reproduce that chair, or construct monstrosities. It is only the architect or the engineer who can really practice a craft to-day. Where new materials are allowed to shape their own forms, as for the builder, we see again the old miracle of beauty appearing. But how can this occur with the common objects of our life, produced in mass and touched only by the machine-tender?

The result of the machine has been to transform the serious business of practical production, leaving the so-called fine arts hanging in the air, an old tradition uprooted from the soil where it grew. The artist is no longer a man who has carried a little further the tech-

niques of daily life. He is a man apart, deliberately turning his back upon the activities you and I perform. We cannot help him; we cannot even understand his problems; we can neither inspire him nor judge his work. Between us and him there yawns a gulf. What machine-tending reporter can comprehend the studied labor of the serious writer? What journalism can pause for the perfect phrase? What newspaper reader can wade through the poems of the past? We live our lives; and then, too, there is art.

The standardization of mass production has made impossible the individual touch of the craftsman. It is not, as the Morrisites thought, that there is any special beauty in the imperfections that come from crude tools. If instead of the varied pottery of the past the engineer should decide to turn out one single design, that pot could easily be made the most beautiful in the world, and all its fellows would not cheapen its beauty. But we should not see it; it would not add to our enjoyment; it would stimulate no further creation; to us it would be simply "the pot." There is no reason why the movie should not be a new art, unlike the drama of the past, employing its many resources to enrich our imagination. The factories of Hollywood find it more economical to turn out two or three standardized plots that will have a steady sale the world over; those not made callous are bored to distraction, while the rest are unable to support a real stage.

With craftsmanship gone and the stimulus to beauty lacking in his daily life, the factory worker has lost the artist's capacity for joy in things for their own sake. He takes no pleasure in his work; he labors because he has to, and his wage is his only reward. His life be-

comes a set of routines to be got over as quickly as possible. He cannot find satisfaction in his surroundings or his activities. He is making objects that others will use, for the sake of wages he will use in other ways. His days are spent in useful toil, not enjoyment; he soon forgets how to enjoy at all. He loses sight of the end for which all this toil is undertaken, and thinks more production, more money in return, the only thing of real importance. He values quantity more than quality, and machinery more than its uses. When his labor is over, he rushes frantically from one mechanical thrill to another, and can rest in none. He tinkers with an elaborate radio but finds nothing worth hearing; he dashes off in his Ford to one filling station after another. Even in his dreams he can see only better factories and larger pay-checks; for this useful economic life has become the goal of existence. But of what it is useful for or how to find serene joy in anything he has no inkling. He cannot understand how other peoples sang as they worked, and made a festival of planting and harvest; he can neither live beautifully himself nor find beauty in what others make. If he dutifully goes in for "art," it is with the profound sense that it is something with no relevance whatever to the life he leads. He is a machinist who in his leisure still plays with machines. And the great artistic tradition of the past can have no real meaning for him.

Thus the combined effect of science and the machine has been to transform art from the natural expression of man's daily life and normal activities to a realm apart, with traditions and attitudes of its own open only to the initiate. This inevitable divorce between art and the life of the average man was accentuated

by the spirit of the artistic movement reigning at the beginning of the last century, in whose backwash the artist has been working ever since. The century was ushered in by the great struggle between classicism and romanticism, the one expressing the spirit of the commercial and rational 17th and 18th centuries, the other essentially a protest against those rising currents and an escape to the realms of fancy. Broadly speaking, the classicism of the French stage and Pope, of Versailles' formal gardens and of Georgian architecture, was a concentration upon craftsmanship, employing highly elaborated and strictly formulated techniques. The romanticism of *Werthers Leiden* and Goethe's early plays, of Coleridge and Wordsworth, of Scott and the Gothic revival, was an insistence on the supreme importance of imaginative insight. The men of the Age of Reason may not have been inspired, but they turned out workmanlike products. They were at their best in making the graceful appointments of a comfortable home. It was the great era of furniture, of textiles, of carved mantel-pieces and doorways, and of porcelain. Many a New England village preserves to this day the spirit of the honest carpenter and joiner who added to moderate prosperity the refinement of restrained form. The trim church on the common shows how far craftsmanship can go without the spark of divine fire. And in the other arts, the classic age triumphed where skill was added to vital intent,—in political pamphleteering, for example, and in occasional verse.

The greatest romanticists retained this love of technique at the same time they sought a closer contact with the emotional pulse of life. Goethe studied the

Greeks to mature his powers, and brought something of Hellenic restraint to his restless passion for the fullness of life. But the lesser men were primarily rebels, impatient of all bounds and rules, eager to flee from the very limitations of humanity. They found blank verse easier than the sonnet they scorned, and shrinking from the workaday world they turned to historical romancing or expressing in luscious words the emotions of their dreams. Marmion, Kubla Khan, Endymion, Alastor, the Witch of Atlas,—these show that even the great were not exempt from this escape to words and vague longing. It is no accident that the romanticists were most successful precisely where the skillful classicists failed, in the realms of poetry and music where pure imagination can soar far beyond the actualities, and that where resistent material demands close attention, as in architecture, they left no great monuments.

However much a Goethe or a Wordsworth may have striven to find the common life of humanity, the romantic spirit that gained popular acceptance was the yearning to flee from politics and commerce and unsettling science to the world of fantasy and dream, to the rich pageantry of a tinsel Middle Ages or the wish-fulfillment or the pure heroine and the base villain. Art may have been the breath of life for the artist, but for the average man it became the great escape, a world in which he might take refuge from his drab surroundings. It was just because in romance or melodrama he forgot himself that he cherished them. And amid all the changed aims since, for the great mass this divorce has remained stamped on the activity of the artist. It is as true of those who crowd the movies

or devour the police-court thrillers as it was of the readers of Scott or Victor Hugo. We take it so much for granted we do not realize the social revolution over the days of the Medici or Elizabeth.

Quite naturally, since they were seeking flight, the romanticists withdrew into a social world of their own, created private Bohemias, and sneered at the bourgeoisie. The latter retaliated, and from being the respected citizen and honored master workman, the artist grew suspect, disreputable, tolerated only that from his golden world of Soho or Greenwich Village or the Latin Quarter he might conjure up dreams for ordinary mortals. Of his true interests, his deeper urges, the average citizen knew little and cared less.

It was while art was thus sequestered that industry grew up a thing apart. The artist was a refugee from the serious business of daily toil. An understanding of his works was the mark of financial success, of release from the cares of business, and of studied leisure. The wealthy went in for art as a form of conspicuous waste. English mill-owners collected Italian primitives. American millionaires acquired whatever shrewd Europeans could persuade them to buy. Prosperous communities in democratic emulation built huge museums to house these collections when their owners died. It never occurred to them that in their prime Athens or Florence needed no museum, or that an art gallery in a sea of stuffy parlors and reeking tenements was an anomaly. Coketown, grown ashamed of its ugliness, let bids for "arty" public buildings; town halls blossomed into Norman castles, banks into Greek temples, and meeting-houses into pseudo-Gothic cathedrals. Even the home dedicated a parlor to "art"; there waxed bric-a-brac,

embroidered hangings, colored prints and limp-leather poets, and there young ladies strummed the piano, sang sentimental songs, and gave dramatic recitals. It was the proper thing to do; and only uncouth males objected—and artists.

With art thus established as an isolated realm, unshakable just because it had no roots in popular life, it was little wonder that again and again it proved a welcome haven for sensitive souls disillusioned with one or another of the 19th century enthusiasms. Eternal beauty was more secure than the rock of ages; the artist offered a religious consolation the priest was powerless to give. The men of genius, indeed, tried to find inspiration in the uncongenial soil of the laboratory and the city. But they were repeatedly swamped by the host of æsthetic refugees fleeing from science or the failure of social hopes. The disheartening aftermath of the revolutions of 1848 sent men running to the beauty that alone knew no discouragement. The artist now built him an ivory tower above the battle; there in his studio he could chisel and refine and polish and forget the world. After the storms of romantic humanitarian and democratic passion that had raged in the windy thirties and forties in France, men like Gautier and Leconte de Lisle and Flaubert tried to forget Napoleon the Little in perfecting their technique. A Tennyson or a Swinburne forsook progress and liberty for the Arthurian romances or the glory that was Greece. Poor fickle humanity! beauty alone mattered, now.

And when science pushed its way in, shaking the religious world in which men had found emotional freedom, there set in a new flight to the ivory tower as a

refuge from religious despair. Great pessimistic philosophies flourished. In the sixties Schopenhauer came into vogue, bringing the popular message that all was vanity, that life was a pendulum swinging between craving and boredom, and that only in the timeless realm of beauty was there release. Omar was on many a lip; we know not whence we come or whither, so let us eat, drink, and cling to the book of verses. From his Oxford chambers Walter Pater taught the refined that in this brief pause of sunshine the wise seek the utmost of sensation, and the wisest find it in the gem-like flame of art. For human hopes of God and aspirations for justice Anatole France had only pity and irony, and the love of good books and fine prints. Life is brief and art is long; perhaps, said the thoughtful, not so long as the old eternity of Heaven, but long enough for our little day.

Meanwhile painters and novelists who resisted this wholesale rout seemed tangled in the mere surface of the new world. For them no Greek gods or Latin lyrics, no tarrying in the lost land of Lyonesse. If the old symbols no longer moved men, if the great imaginative traditions were gone, then follow the lead of science and study the present. It was the age of realism. Sculptors took life-masks and made careful measurements. Painters photographed their models, drew Rover and his barnyard friends, or caught the blacksmith with uplifted hammer. The best of them studied the light on the trees or housetops, and the impressionists proudly exhibited whole series of studies of the changing colors on a single street-corner. Novelists painfully set down those impressive autobiographies that reveal everything but a soul. They resolved to

leave out not a single thought or feeling, until to-day it takes eight hundred pages to do justice to twenty-four hours. In trying to remove the fourth wall of a room and eavesdrop on the conversation, dramatists forgot the stage. From Dickens and Ibsen on, some sought to seize and direct the passing currents of social aspiration; but their reward was passing interest. More preferred the reporter's notebook to the preacher's pulpit. The one great passion science could not still nor business consume swelled into the ever-recurrent and absorbing theme; and the changing life of sex was scrutinized, analyzed, surveyed and resurveyed.

It is now over a generation since the serious artist has revolted at all this mass of undigested, formless material, and in disgust sought the sheer pattern of beauty all naked and alone. It was the painters who first refused to be mere kodaks. Hesitatingly they have turned to putting paint on canvas, setting color against color and line against line. Modern art was born of this new reaction against the realistic and academic tradition, and fostered by fruitful contact with the skill of China and Japan. Possessing no imaginative material, and wisely shrinking from the suggestive prettiness of the magazine illustration, it has explored the possibilities of pure design and plastic form. Often it seems merely to emulate the Turkish rug or Persian tile; often it is groping for something beyond. Often it strikes a marvel of spacious color; oftener it merely annoys. The sculptors followed by treating marble as marble, clay as clay, and wood as wood. Musicians forgot their imitative program music and tried new harmonies. And to-day even those last strongholds of

realism, the novel and the stage, are feeling after new techniques.

The true artist remains an artist; the æsthetic critic often allows his justifiable revulsion at realism and mere illustration to push him to extremes. One note rings clear in all the hosts of theories that have accompanied this new emphasis on craftmanship: it is that art must be pure, unsullied by any compromising contact with the world. Its laws of form are to be isolated from human life; its realm is to be self-centered and self-contained. You may paint the Virgin or a plate of fruit; better the latter, for before the Virgin some fool might think of God. Beauty is killed the moment it touches ideals or aspiration; it is an affair of paint and paint alone. Just so, we are assured, felt Giotto before St. Francis; just so felt the esteemed El Greco in the light of doom. How studied are the curves of Buddha's countenance! how splendid are the vowels in Dante's Hell!

Once again we are bidden to flee to such a world of pure technique. This and this only is art; this alone is beauty; here is no struggle or striving, here is peace. And as never before all who are weary and heavy-laden, who shrink from industry unseating justice, the machine making man over in its image, and science hurling God from his throne, seek in the calm of the ivory tower the consolation other ages found in the monk's cell. These artists have bolted the gate against the new civilization; without them it marches on. And while they gather to themselves all that is left of otherworldliness and the urge for purity, the world is left to strident jazz, the mercies of Hollywood, and the Saturday Evening Post. For who outside a narrow

circle knows or cares about one of these masters of modern art? To the average man, their very names mean nothing, their pictures and music are Greek.

A century ago, in a like wave of yearning for what had been left behind, men fled to God from their uncongenial world. They found him in the thin abstractions of the transcendental realm. And to-day it matters not a whit. Will the protest of our modern artists prove as unavailing? Will beauty too forsake the haunts of men to perish of starvation in the tenuous realms of significant form? Is this art of renunciation and disdainful flight the last stand of those who cannot bear to abandon the old civilization, cannot face the city, the laboratory and the machine? Will they dwell on their heights a pure race apart until they die? Or will "art" cease to be the last refuge of the despairing, and a fresh artistic impulse rise within the new world?

It does not seem wholly impossible. There are arts that have been actually quickened by the demands of contemporary life. Already the architects are showing what they can do when they forget the Beaux Arts tradition and apply themselves seriously to the problems of steel and concrete. We are a race of builders the like of which has never been seen. So far we have been held back by reverence for past models. Confronted by the sky-scraper, we have tried to stretch out the Florentine palace in our sketch-books. We have constructed gigantic columns because the column was the only Greek design both tall and narrow. We have heaped up an invisible mass of Gothic ornament. Now at last we are slowly discovering what a sky-scraper should be, and what ornament can appropriately en-

hance its lights and shadows. We have been most successful in our great bridges, where since there was no model we had perforce to study the problem afresh.

Poetry can express any really vital emotion. Our writers have been afraid of our real lives; but to-day they are finding humanity even in the factory. Our generation has seen a revival of the drama the like of which we find only in the 16th and 17th centuries. There are reservoirs of new emotion, the passions of this age of conflict, class feeling, mass madness, waiting only the hand of genius. There is a wealth of new ideas that have only to be assimilated to become fit material for the artist. As yet they are so novel that we must argue and defend and expound, forgetting the while to create. We write a play to set forth Freudianism rather than human struggle. But already we have established a certain dramatic tradition within whose framework an artist can cease to apologize. We have passed beyond the pioneering stage of Ibsen or Shaw. The novel, too, is flourishing as the typical canvas of our multitudinous life. Of all the arts it is still most caught in the older photographic realism; but we are more and more frequently achieving a significant emotional pattern. The Dreisers are definitely of the past; even in Proust we appreciate the design rather than the materials. Throughout all our writing there runs too much theory, too much intellectuality. It is a sign that we have not yet fully entered our new world.

Painting and music—we can make of them what we will. We have a newly discovered wealth of forms that wait only for the material of a common life. There is no reason why we cannot use what we have. The very standardization forced on us by the machine process

has created a machine culture in which we are all at home. It is surely as rich as the standardized life of the primitive folk who have in the past risen to such heights. Are our horizons not wider than the narrow world that fills the Italian paintings? Ours has only to become as intense, to be really felt. And science—what realms await artistic exploitation there, when scientific ideas have through education become as familiar as the Gospel story or the lives of the saints used to be. Such art will be more intellectual than that of old, because we must perforce live more by ideas. But it need not be the less significant.

Already our painters are groping to catch the spirit of the machine. They are experimenting with pistons and wheels, with the geometrical forms of the industrial process, with patterns of mechanical motifs. The human figure has revealed new possibilities when treated as what our world has made it—one machine among others. When we come to realize what the dynamo means to us, need it be less inspiring than the Virgin?

Artistic traditions may die out, or linger to hamper us. But they cannot extinguish the instinct to create. Most hopeful of all signs are the efforts of children to set down in paint or clay or ink what really strikes their souls. The products of those schools where past models have not crushed initiative are remarkable instances of what can be done with the materials of our modern life. These children do not know that they ought to copy models or deal with traditional themes. They express what they see about them with an amazing vitality and power. We need to find a way to teach them skill and craftsmanship without destroying

the precious spark of imagination. Conceive a whole generation taught, if not to create, at least to understand what the artistic enterprise means. The Germans perhaps, though they are too bound to the old traditions by their learning, are succeeding best in such an endeavor.

Nor need craftsmanship be divorced from the machine process. It will be of a different sort from that of the past; it will come from the designer rather than the artisan. It may not play the same part in our lives that it once did. But will it not make a difference if all the utensils of our daily living come to possess something of the quality of, say, the best motor-cars of to-day? Theirs is a beauty we can all appreciate. Already a few are trying to design furniture in the same manner, making the most of our modern materials and techniques. It will at least remove the sheer ugliness in which to-day we are forced to pass most of our lives. It may even help to build that world of common experience that art demands. We shall escape the deadly parasitic museum atmosphere that fills our homes.

As yet we are very self-conscious about expressing the industrial and economic forces that surround us. We argue, we reflect, we reason out theories, we make an effort to take thought. Our minds have found the new world, but our deeper life of feeling and emotion lags behind. Those who have boldly plunged into the chaotic world of wheels and whistles and jazzed emotions are still groping for a language that both we and they can understand. The machine is as yet too new to be more than a fantastic stage-setting. We have not lived with it long enough for it really to enter our

souls. Our passions are not yet attached to it, nor does it naturally attract our imagination. When the whole man is really at home in the new world, surely the old human urges will shape new symbols, and some great faith will inspire us as the gods did in the past. Our conscious life will no longer be warring against our deepest desires. We shall move more freely amidst accustomed furniture. Is it too much to hope that with the wealth of new techniques with which we have been experimenting, the human spirit, once its vision of life has grown spontaneous and unlabored, will quicken again with imagination? Rome too seemed dead; but out of Rome came the glories of Christian art. If we ever succeed in making an adequate adjustment to the city and the laboratory, if we ever turn our dread and dislike into an active faith, we shall not need a host of reasoned artistic theories. We shall find creative insight spontaneous and natural, and who knows but imagination will raise mechanical craftsmanship to the level of fine art?

XII

THE CITY, THE LABORATORY, AND THE MORAL LIFE

Most deeply rooted of all the institutions of a society are its moral ideals, the basic attitudes it holds and the ways in which it regulates the most intimate details of life. It is easy for the missionary to introduce improved weapons and tools among a primitive people. Given a generation or so, he can teach them new gods and new prayers, train them in medical science, and utterly destroy their art. But they will go on treating their wives the same old way, and they will still find strange the white man's tireless pursuit of money. Just so the peasant family from some remote Carpathian village soon puts on the manners of New York, and its children become mechanics or even scientists; but they continue to follow the moral precepts of the priest, and are as unable to see that birth-control and divorce are not sins as that drinking wine is.

Hence the 19th century was far advanced, and both religion and art had been profoundly shaken by the city and the laboratory, before the slightest doubt arose as to the eternal truth of Christian morality. The Victorian age reëchoed to the vigorous criticism of historic theologies, and its artists made daring breaks with the past; but its morals remained impeccably pure. Men might be agnostics or atheists, but the life they admired was as stainless as King Arthur's. Robert Ingersoll, who toured the country to point out the

mistakes of Moses and the lewdness of the patriarchs, was a stalwart Republican with a family life modeled on that of Queen Victoria. The daring English radical John Stuart Mill, brought up by his father unpolluted by Christian doctrine, worked all his life to convince men they might act for the good of society rather than the fear of God, and still adhere to the letter of the accepted Christian moral code.

This persistence was the easier because one great moral break with the Christian world had already taken place. The joyous artist of the Renaissance and the single-minded Puritan had three hundred years before so reconstructed the traditional Christian ideals of the monk and the knight that they fitted perfectly the worldly, freedom-loving spirit of business enterprise. When men now thought of God's commands, this spiritual revolution was so far behind them they forgot God had ever been served in other ways. To the man of the 19th century, fasting and penitence and celibacy were positively unchristian.

Moreover, it was science that first took the offensive, and science seemed much more hostile to Christian theology than to Christian morals. The new worldly moral orthodoxy had passed unharmed through the rationalists' criticism in the first wave of scientific enthusiasm. The humanitarian ideals of the 18th century, benevolence and tolerance and freedom and the rest, were after all but abstractions drawn from the current of Christian love and righteousness. And now that science was renewing its attacks on traditional doctrine, men fell back on the comfortable assurance that at least no one dared assail the moral inspiration of the Scriptures. If Moses was proved

painfully ignorant of geology, no man could doubt he had set down the final moral truth. Science, alas, was destined to lay sacrilegious hands on that inspiration also, but as yet our disturbing psychology and anthropology were not born.

So it was that the moral tradition escaped the outspoken criticism that was dissolving religion and art. Hardly a voice was raised to question the Christian ideals, at least in their Protestant version. But the forces of the factory and city life were swiftly accomplishing what no skeptic demanded. Silently they altered men's actual conduct until their cherished ideals came to have little bearing on the problems they daily faced. The religious and the artistic revolutions were ushered in by the noisy debate of assailants and defenders. They were accompanied by hosts of new theories to take the place of the old. But our moral revolution has crept stealthily upon us, with few even aware of the momentous changes occurring. In our conduct we are to-day confronted by transformation as a fact, not a theory. If the traditional home is dissolving, it is not because of evolutionary science, not because of radical attacks, but because of city apartments and the wage-earning woman.

When their ways of living came at last to contradict completely their professions, the thoughtful were not a little perturbed. They organized movements to impress others with the need for maintaining the sacred institutions. Business men in their Rotary Clubs sang songs to the spirit of Christian service. Manufacturers founded leagues to foster the observance of the Constitution and the sanctity of individual liberties—among schoolboys. Women's clubs campaigned for the

preservation of the home. Even diplomats held peace conferences. Yet it never occurred to any of these earnest souls to practice what they preached. Nor in all truth could they; for the ways they followed and inveighed against were forced upon them by every circumstance of their environment.

We are just beginning to wonder if the time-honored ways we do not and could not practice are really the best ways for to-day. In the last ten years we have come to doubt whether our obvious failure to put our ideals into practice is the fault of the practice or the ideals. And some few fearless minds are reaching out for ideals that will be pertinent to our real problems, ideals that will not be hopelessly at variance with every element of our industrial life. To most of us, this is the utter dissolution of all that is holy and right. But to some it seems that for the first time we are beginning to face the immense task of adapting our moral faith to the needs of our industrial, scientific world. For though we as yet hardly realize it, the point of friction between the old civilization and the new has profoundly shifted. It has advanced beyond the 19th century conflict of science and theology to the far more extensive struggle of our whole machine society with the basic moral institutions and ideals of the past. That earlier battle may well prove to have been merely the opening skirmish in a warfare that is destined to involve literally all the familiar landmarks. Our fathers wondered whether they could still believe in God and immortality; we are in doubt how long liberty and democracy and the state, the home and marriage and the Ten Commandments, can possibly endure.

For to-day it is dawning upon us that the whole great Hebrew-Christian moral tradition, the most ancient element in our heritage, from which again and again men drew the inspiration to remould their lives, is crumbling to pieces before our eyes. It stood the shock of the paganism of the Renaissance, and flowered in a new moral earnestness of endeavor. It met the forces of Newtonian science, and brought forth the great humanitarian ideals of the age of reason. It encountered the spirit of commercial life, and emerged in the democratic faith. It stood firm while Darwin was changing the map of the intellectual world. Now it is face to face with the city and the machine, and its old vigor is gone. The issue is not yet clear. Will it at last give way before the new standards of technology and mass production, or will it have the power to assimilate them also? If it does, the price is bound to be a far more thoroughgoing reconstruction than any it has yet faced. No man is wise enough to predict the outcome, but one fact at least is clear: it is this problem of moral reconstruction that is to play the dominant rôle in the gropings of the next few generations. It is with this issue that the philosophers of the 20th century will have to wrestle, and it is the attitude men take toward it that will determine the course of their lives.

So soon as we candidly examine the things we really care for, it is amazing how far we have already departed from the old Christian ideals. Take the basic strain of asceticism, present in some form in every past Christian society. Asceticism is at bottom the claim that the essential quality of human life does not depend on meat and drink and raiment, that the good

life can be lived without possessing an abundance of things. It is the natural cry of societies living on the verge of starvation, barely wresting a living from the soil. In the Orient, where to this day whole civilizations are built on the crudest methods of agriculture, it has been the great democratic ideal, voiced by those prophets with souls too sensitive to acquiesce in complacent ruling-class codes. The great religious teachers of the East have proclaimed the message that men's crushing poverty does not matter; that they can still live nobly, still attain the highest. Buddha forsook family and kingdom and riches to find salvation in the lot of the common man. In a word, those societies have made a virtue of renunciation where the average man had little to renounce; and before the industrial revolution there were few exceptions.

Now it so happens that every age that contributed to our own moral heritage was facing just such heavy odds. The Jewish prophets spoke to a harassed nation. By the waters of Babylon there was little left but righteousness. In the days of Jesus came the final struggle with Roman imperialism. His message was for men who could not hope to win a kingdom in this world; but they could still practice resignation, purity of heart, and love for the oppressor. And when Christianity took form within the Roman world, the old sense of confident achievement held by the city-state had been lost. It was giving way to doubt and despair before the tasks of empire, the depletion of the land, the decline of commerce, and the pauperization of masses and middle class alike. Even when European society slowly cleared the land and reëstablished commerce in the Middle Ages, it was a long up-hill strug-

gle; the cloister or the hermitage made a natural appeal to weary souls. Built up under such adverse conditions, it is little wonder that the basic note in our moral tradition has been submission, resignation, humility, patience, and charity. Unlike the fortunate upper class of the Greek city-state, no one of these societies could hope for much in the way of material achievement; quite naturally they idealized a kind of spirituality that meant indifference to the world. They dared not picture to themselves the best life for man; they dared only strive for the best life possible in an evil and impoverished world.

With the gradual building up of a surplus and the fruitful quickening of commerce, the Europe of the 16th and 17th centuries took heart, and looked for salvation in this world. But the Puritan business man still saw only a hard, stern struggle, demanding thrift, unremitting toil, and no dissipation of energies in profitless pleasure. Abstinence and a single-minded devotion to business were the only hope of the worldly asceticism of the Puritans. It was this society, just emerging from grinding poverty, that set before itself the romantic ideals of continued striving. Not achievement, but struggle, the joy of going on—therein lay salvation.

Overnight mechanical invention has relieved us of this haunting fear of starvation. At one bound the harnessing of power has made our society rich beyond the dreams of any that went before. With our resources it is easily possible for every man to enjoy comforts and luxuries the Cæsars could not command; and in America at least most of us do. In this world of incredible devices for the easing of life, what can

remain of the moral ideals of those centuries of destitution? Where is there room for resignation and humility and patience? Who can preserve a righteous and a contrite heart? Who, taking no thought for the morrow, can strive only for an inner purity of word and deed?

Our own America grew up after Christians had begun to hope that hard work might show results. The Puritan ideals it so took to its heart were admirably fitted to a pioneering society, clearing the land and building cities for those who came after to enjoy. But the industrial revolution burst upon us while we still had the resources of a continent to draw upon. The resulting wealth of our generation has become the envy of Europeans. Hence we have already forgotten the frontier; we lead all Christendom in abandoning the old ideals. We laugh to-day at toil and thrift. We sneer at abstinence and honest industry. We worship prosperity and success and riches. We find spirituality incomprehensible, and humble resignation absurd. We do not want to do our duty in the fear of God; we prefer comfort and pleasure and fun. Our ideal is not purity and righteousness; it is to have a good time. We seek in our own lives those joys which previous societies, not daring themselves to covet, bestowed on their gods.

Nor is the pursuit of momentary pleasure the only fruit of our power. Europeans still laugh at our inexperience; for their upper class has had longer to learn the wise use of riches than we sons of pioneers. But though we are still a curious blend of crudity and insight, we are gaining knowledge. We spend millions for sanitation and public health. We have reduced the

infant mortality rate to unprecedented figures. We love outdoor sports. Though we tolerate vast stretches of ugliness, we are keenly aware that beauty exists. We may dance to weird strains, but we flock to the best music, listen to famous musicians, and throng the conservatories. Though we flood the world with horrors from Hollywood, we eagerly snatch the great paintings of the past, and even raise up artists ourselves. We perpetrate slums and suburbs, but our architects are as creative as any in the world. We underpay learning, but we have amassed huge libraries, and our scholars are tireless. Though we consume the Saturday Evening Post and Harold Bell Wright, we are also the chief support of many a European writer who despises our barbarism. We may devour Frank Crane and Eddie Guest, but our best poets are worthy of their great English heritage. Our theater is a commercial enterprise, but it is as interesting as any in the world. We live on the tabloids, but our news services are unrivaled. We stage monkey trials, but we create tremendous endowments for scientific research. We may not know what it is all about, but we flock to college and we have an ureasoning passion for education. Our schools may be regimented and ridden by politics, but we are trying a thousand experiments. We have an overweening self-esteem, but we are our own severest critics. In all these things Europe is aping us as fast as she is able; for our follies and our sophistications are but the natural results of the industrial wealth that is flooding the world. Give us another generation or so, and we may acquire the wisdom to use our vastly greater material resources with something

of the discrimination the citizens of ancient Athens or Florence applied to the wealth trade brought them.

For that is the real moral problem that faces us. Where is the wisdom and the intelligence to use the power of science and the machine aright? In our whole moral tradition there is no answer. In all its profound plumbing of the human spirit, Christianity never faced that question. Of what avail is it to tell us to renounce the world, or to abstain from pleasure? We need an ethics of achievement and mastery; we have only an ethics of consolation.

The new ways we actually follow have been brought us by the resources of mass production. And now science enters to confuse us still further. Men seize its high authority to claim that the long ages that counseled abstinence were wrong. They were afraid to admit, we are told, that what they could not secure was good. Their poverty has saddled us with a needless idealization of the renunciation that was once inevitable. We hear the seductive reassurance that such a life of healthy pleasure, of wise enjoyment of a varied world, answers the natural needs of the human frame. The old toil brought men to an early grave; the humble fare of our fathers bred disease; the time-honored repressions were fertile in nervous disorders and unwholesome aberrations. Despite the chances of modern life, measured by biological and psychological standards the ascetic and the Puritan were not the equals of to-day's city-dweller.

In these assertions there is enough of truth to break down the intellectual resistance of men sorely tempted by our material wealth. Most of us do not stop to

inquire what after all constitutes healthy pleasure or wise enjoyment. The old self-discipline has been discredited; why bother at all with the disagreeable task of self-control? We eagerly and thoughtlessly grasp the pleasures offered us, with no thought for a well-rounded and balanced life. What wonder that we have raised up a new crop of neuroses and complexes ten times more troublesome than the old? We treat our new-found riches with the recklessness of a pauper just come into an unexpected fortune.

The core of the old morality was its attitude toward sex. When the Puritans abandoned to business the claim to regulate the whole life of man, they concentrated all the more on the sexual urge. Indeed, for the Christian, sex has never been a natural force to be ordered wisely like the other forces of life, but a creature of the devil to be fought back unremittingly and kept within the strictest bounds. To the Puritan, immorality had but one meaning: it signified all conduct that failed to conform to the narrowest code of lifelong monogamy. Though often honored in the breach, though ever supplemented by inconsistent but recognized practices, this deep concern did lend a strength and a sanctity to the ideal of the Christian home unsurpassed by any other moral institution.

That home, as we have seen, is now disintegrating before the forces of urban life. For better or worse, it is giving way to a sexual attachment that lasts only as long as love remains. For the most part, the old conventions are preserved by the form of legal divorce, —though to many the distinction between free divorce and free love is rather tenuous. Some even find authority in science to view the matter "biologically":

for them love itself is too absorbing, too insistent on self-discipline, to satisfy their full cravings. Whatever the form, the essential fact is that sex is no longer a disgraceful necessity, no longer the shameful prelude to procreation, but a natural relation that may be moulded into a fine art, the recognized basis of marriage, the major theme of our literature, the indispensable fulfillment of a normal life.

To all that the city with its changed status of woman has brought about, there is now added the voice of biology and psychology, questioning, investigating, laying bare the far-reaching consequences of a faulty sexual adjustment. So recently has the whole matter been dragged from the darkness of secrecy that we are still bewildered, knowing not how to order these relations of man and woman. Free at last to speak of things once unmentioned, we have not yet escaped the sense of guilty shame with which they have long been cloaked. We revel in sex like the small boy who has just seen through the stork. We are hectically trying to make up for centuries of repression. No wonder we are creating a host of new problems by our folly, and justify them by the most incredible theories. We have yet to learn the self-discipline that can replace the old external, artificial control. We have even formulated a psychology that urges us not to try. Young people to-day are cast adrift sexually to sink or swim by themselves. They know that the old standards have broken down, but they have little inkling of what must take their place. Never have the sins of the fathers been visited more pitilessly upon the children. In this most intimate of all human relations it is not enough to set forth bravely to experiment; the

costs of a misstep are too great. Nowhere is the need for a new set of moral standards adequate to our knowledge and conditions more insistent.

What those standards will be when they have been created is not certain for even the most thoughtful. But it is at least clear that the traditional asceticism and repression are doomed, and that the whole long Christian warfare of spirit upon flesh affords only the dimmest light for our path. "Incease and multiply;" —"It is better to marry than to burn;" —"It is good for a man not to touch a woman;" —not here is sufficient wisdom for an age that has resolved to let both man and woman make the utmost of the beneficent riches of the sexual life at its best.

On a third score the industrial age has outgrown its inherited ideals. Whatever we may judge as to the spirit of Jesus, the strength of the Christian tradition has come from the salvation it offers to individual men. That salvation was a private thing. The Christian forsook the world to save his own soul. The warm love that beats in the Gospels turned to charity, prescribed for the spiritual fruits it brought rather than its practical outcome. At its best Christian charity stood as the symbol of a pure heart rather than of any real concern to improve the lot of the needy. Nor are the virtues of the traditional Christian life—forbearance, meekness, longsuffering, temperance, chastity, faith, hope, and love,—the virtues that order society. They deal with the relations in a very simple group, at most a small farming community. In the early congregations, in the isolated monastery, even within a single family, could be exemplified all the goodness that really matters. Where Christians have

not lived as groups apart in an alien world, their more complex social relations have always been ordered on principles drawn from other sources. The barbarians brought their warrior code, the Renaissance looked to ancient Rome, the middle class swore by commercial shrewdness and self-interest. Though for a brief spell in the Middle Ages the Christian ideals were stretched to order an entire society, even then they had to forsake the Gospels and seek help in the thought of the Greeks. And the individualistic revulsion from feudalism, the guild and the Church, drove men back again to the private virtues. The Protestant concentrated once more on a few simple relations, and left the great domain of social and political life to the naked play of business enterprise. Out of this Christian individualism the commercial age drew the negative ideal of liberty. Beyond the narrow circle within which morality was to function, there should be no interference with the ambitions of the merchant, the middle class, or the nation.

We are still sentimentally attached to our 18th century heritage of freedom, toleration, self-reliance and individual right. But it left society helpless before the new conditions and problems of the industrial age. The factory and the city that knit men's lives into a complex fabric of ever-widening groups, called for far-reaching organization. To face these issues men had no moral equipment save the pathetic precept, "Hands off!" How far could simple honesty carry the head of a huge corporation? What could faith, hope and charity bring to a woman factory worker? What could forbearance and patience hold for child labor? Of what avail were thrift and industry amidst the eco-

nomic rivalries of nations? To be sure, we have pathetically tried to stretch the Christian virtues till they have grown thin; but what real guidance for the intelligent ordering of the Great Society can come from reiterated devotion to unselfishness and service? It is possible to do unto our neighbor as we would be done by, but of itself that solves not a single difficulty of the industrial magnate, the investment banker, the head of a labor union. What statesman, however high-minded, could find in the Golden Rule alone the answers to all the moral perplexities of statecraft?

We still have the uneasy feeling that if we really practiced our Christianity, all our troubles would vanish. Perhaps they would; but we fail to realize that Christian ideals applied in our industrial life would resemble in name only the virtues of the past. To translate the Golden Rule into economic practice would demand an expenditure of forethought, prudence, and careful, intelligent investigation utterly alien to the simple and uncalculating compassion of either the man of Nazareth or him of Assisi. The truth is that these moral leaders of the past were individualists, taking no thought for the larger problems of social relationships. Their wisdom was offered for the simple farming community, at most for men suffering under a hopeless oppression. Leaving to Cæsar the things that were Cæsar's, they spoke to the conscience troubled with the problems of a narrow personal life. Such moral sustenance has strengthened millions. It has bred the loving father, the tender wife, the compassionate neighbor; but it has given Cæsar full sway over trade and manufacturing, politics and international affairs. It offers no clear or intelligible pattern for the right

ordering of group relations; and in the world of the factory and the commercial nation such group relations have caught up the most intimate details of our lives, till not a personal moral problem can be solved save in the tangled threads of the social fabric in which it is enmeshed. To face this broadened struggle we ask for new weapons; and we are told to scour our grandfather's flintlock till it is spotless. We confront that disturbance of delicate adjustments we call juvenile delinquency; and we are advised to teach the Ten Commandments and use the rod. We are in the midst of the intricate problems of allotting world markets and raw materials; and we are bidden to be unselfish. Our moral heritage has proved hopelessly inadequate for the group life of to-day.

And now that our modern command of wealth, with all its responsibilities and cares, our untold control of natural powers, our appetite for comforts and pleasures, our more fluid yet more insistent sexual habits, our narrowing liberties, our inevitable collectivism, have all conspired to carry our conduct far beyond the reach of our old ideals, science has added its voice to the hitherto silent challenge of industrialism. When psychology and anthropology undertook a serious study of human nature, they did not stop before the most sacred moral feelings. By making clear how the new-born infant owes everything to his group, how his every thought, his every feeling, his every way of acting are dictated to him by the culture into which he has come a mere bundle of possibilities, how his sense of beauty, his religious experience, his deepest aspirations, his conscience itself, are social habits, they destroyed whatever rational basis the older individual-

ism had. That individualism itself they explained as the social product of a particular set of needs that has passed away, a necessary stage in the breakdown of mediæval society, but utterly incompatible with the demands of industry. Spirituality and asceticism they classified as compensatory ideals, the sour grapes philosophy of peoples who could not get what they wanted. The older sex attitudes they traced to a mixture of property notions and purity complexes, with inevitable fruits in nervous disorders, emotional disturbances, and illicit sexual excess. They undermined the generous ideals of liberalism, destroying the delusion that man is to any extent a reasoning creature, and that if he be allowed freedom of action his rational self-interest will prevent disaster. They tabulated individual differences in temperament and intellectual ability that made the gospel of human equality seem unreal. They brought to the democratic faith itself, final outcome of our moral tradition, masses of facts as to its theoretical basis and its actual functioning that dampened the enthusiasm of the faithful. Hardly a moral attitude or conviction that has come down from the past but has been either discredited completely, or at least placed definitely in its historical setting in the society that has passed away. To science, our moral standards all date.

Most important of all, contemporary social science has accustomed us to view our moral codes, even when they hold our passionate loyalty, as after all the conventions, the folkways of our tribe. We act as we do because that is the thing that is done. Even when we fiercely criticise our conduct in the light of some unrealized ideal, that too is the embedded custom of our

kind. Men who have learned the infinite variety of human morals, who have seen everything we hold the law of God and nature tabooed by other tribes and other civilizations, and everything we deem most unnatural and foul done with honor and approval, can scarcely feel a sanctity and permanence in our own transitory ways. With so many, many schemes for holding material goods, what sacredness lies in the private ownership of stocks and bonds? With so many inconceivable sexual customs, how can we believe God has ordained Victorian marriage? Folkways are followed, and folkways change, is the cry; the custom of the country can make any act right.

Such a detached and skeptical attitude toward the convictions of the prophets provokes no moral idealism to replace old customs with new; but neither does it raise a hand to preserve the good old ways. It follows the path of least resistance, and succumbs to the life the city forces on us. We do what our crowd does, and know no sanction but its approval. If to this cynical acceptance of the convention of the moment is added the faith in scientific determinism, that what shall be shall be, and that no striving by a single individual can alter the future that is ordained, it is no wonder that the net effect of science on our moral life has been to break down all resistance to the disintegration of tradition, without offering anything to take its place. We are drifting into the industrial world loosed from our moral anchorage in the past, with only thoughtless makeshifts for the present. At bottom that is why we see so often to-day only the dissolution of the ancient verities, and miss the moral reconstruction. We are losing our old faith; as yet we are not sure of a new.

There are, to be sure, earnest experiments. If many drift on through childless marriage to divorce, there are others working out new marriage relations based on a clear-headed acceptance of sex and the modern status of woman. If family after family is broken up, and children are left at the mercy of chance associates, there are homes where the life of parents and children is richer than in any patriarchal household. Never have the claims of childhood been raised higher. Never has there been more serious concern with genuine education. If the old individualism and liberalism is bankrupt, never was there a more vigorous exploration of new schemes of collectivism. If we are still rather bewildered by our newly-acquired wealth, never has a society attacked more consciously the problem of the wise use of abundant resources. If on the surface self-satisfaction and complacency rule, there was never a society that saw itself so clearly, and raised up so many keen critics.

We are studying ourselves, speculating, experimenting. If we do not rush to follow every new prophet and swallow every panacea, it is not because we are wholly blind to our shortcomings. Though we are disillusioned with the old ideals, we are too aware of our ignorance to seize the first random alternative. We may not know what is to take the place of the old loyalties; but the more intelligent of us at least realize it. Our reluctance to be stampeded is not entirely the obstinacy of the die-hard. There is about it something of the cautious, inquiring, experimental attitude of the scientist or engineer. Of course the immediate effect of this realism of ours is to permit the conservatives, who know what they want, to remain in power. We remem-

ber Woodrow Wilson, who was to rebuild the world, and we vote for Calvin Coolidge. But are we really under many illusions? Is it too much to say that the more thoughtful of us are biding our time till we shall have learned more?

It is well for us to experiment. Assuredly our present civilization needs to work out more adequate standards than those it has outgrown. Assuredly these standards must be tested in the fire of our complicated and intellectualized life. But the experimental attitude of the scientist, so much admired for its harvest of verified knowledge, is not enough with which to face the delicate fabric of human relationships. We do not give the child a sharp knife and tell him to go ahead and play. How much more painful a wound can he inflict when, grown to adolescence, he starts out to play with sex! At what cost to other human lives is the blundering trial and error of present-day factory management! Think of the colossal games played by diplomats and newspaper editors and investment bankers with armies and navies, national prejudices and patriotic passions! To dignify such procedure, as we are tempted, with the name of scientific experimentation, is to send a child into a storehouse of chemicals and bid him invent a new explosive. The trained scientist does not recklessly try whatever comes into his head. He has painfully learned all that generations of investigators behind him have been able to discover. His tools, his tests, his formulæ, his very problem have been set for him by the coöperative enterprise of the scientific world. In his most audacious questioning of accepted theory he relies implicitly on the great body of tested scientific thought. Even when

he effects a fundamental reconstruction of the very basis of the scientific structure, he is erecting a broader platform upon which most of the old knowledge may still rest. Einstein has not overthrown Newton's solid achievement; he has given a new perspective in which it may be viewed.

And yet many a prophet to-day calmly bids us scrap all that the past has thought as to the relationship between man and man. Our ethics, our politics, our social and personal ideals, weighed in the balance and found wanting, must be thrown ruthlessly on the scrap-heap. We must start over again from the ground up, and relentlessly experiment. We must proceed by the approved laboratory method of trial and error.

It is needless to point to the result in warped lives and twisted human relationships. Many of the younger of us do not even know that in the past men found ways of avoiding some of our worst difficulties. Those ways have come down to us embedded in a mass of beliefs we cannot share. Most of them seem bound up with the arbitrary authority of an institution whose maladaptation to the social and intellectual needs of the present cries aloud. They have crystallized into a set of donts; their very preachers cannot tell us the reason why. It is little wonder that we grow impatient and resolve to put them all behind us. All the great ages of transition to new moral standards have resembled ours,—the age of the Greek sophists, when traditional Hellenic ideals went through the fire of rational inquiry; the Renaissance, when mediæval otherworldliness gave way to modern secular ideals; the Age of Reason, when Puritanism was followed by the pursuit of pleasure. The shock to-day is even

greater. Yet that is no reason why we should not try all in our power to avoid the miseries of transition.

Our science could help us if we would. It could teach us what experimentation really means. It could enable us to understand the process of such cultural change, and save us from being hurried along by the currents. It could say, "These ways of living are not sacred and immutable. They are not a set of Thou-shalt-nots before which all critical inquiry must stop. But neither are they to be lightly disregarded. They are human discoveries, painfully worked out by whole generations of men. They arose amid definite conditions, and those conditions have changed. There was never a time when they were wholly successful. But embodied in them is the insight and genius of many prophetic souls who have looked at suffering mankind and more or less clearly discerned a better way of life. They have been hallowed by the sweat and blood of millions who have lived under them, modifying the austerity of the prophets, moulding a fabric that could sustain human aspiration without sending men to despair. They are not perfect; they are sadly in need to-day of reconstruction to fit our times. Take them for what they are, the best that our fathers were able to see. Take them, and make them better. The task is not easy. It is no release from obligations and conscience that our day demands. Every increase in the complexity of human society creates new relationships that can be twisted and torn. To rebuild this moral heritage will require as much intelligence as the most exacting scientific investigation, as much creative genius as the noblest art. It will take in addition, if the past be any guide, a sensitiveness of spirit and an insight into the

sufferings and aspirations of men that only the greatest moral and religious geniuses have possessed. Be careful to cherish that genius when it appears. Do not follow it blindly; test its message in your own lives, experiment with its wisdom. But hearken to it as you would to the authority of the scientific discoverer or the creative artist."

This is the critical, experimental spirit that science itself employs. It accepts the best hypothesis to test, not the easiest. It employs the most rigorous standards of verification, not the laxest. It seeks out that principle which will organize the richest body of facts, not the most meager and simple. And in its formulations it constantly embodies new truth.

Yet even a rightly understood experimental attitude is not enough on which to build our supreme loyalties. All human living rests ultimately on some faith,—the faith that certain things are of transcendent importance. Such final values can not be touched by scientific verification. They are exempt from experiment. The scientist himself has such a faith,—the faith in science. His ultimate conviction the laboratory can neither prove nor disprove, for it is the faith in laboratory proof itself. Such supreme allegiances can find no other verification than that men do and will live by them.

It is these final goods that are enshrined in a great moral tradition. They are handed on from generation to generation, for they do not grow spontaneously in every childish heart. It has taken centuries for civilizations to attain their ethical wisdom. Those who can contribute to it are rare, far rarer than scientists or artists, so rare that men have looked on them as divine

and on their messages as revelation. When such prophets arise, they do not beseech men to listen, offering signs and tests that they bring truth. They speak with authority, and some few follow in their train. Slowly their insight wins its way among their people, knowing no other test than that men cannot deny.

Our own moral heritage has been rich in such ethical geniuses. The Hebrew prophets thundered, "Thou shalt not violate thy brother's soul," and something in their fierce zeal won the entire Mediterranean world. The man of Nazareth added, "Thou shalt love thy neighbor as thyself," and even Christians have never been able entirely to forget. The revolutionists of the 18th century set forth, "All men are created equal," and for all our despair and bravado, for all our little theories and our bitter experience, we know that somehow it is true. These convictions are not the fruits of experiment, they are its premises. They are touchstones by which we ultimately judge.

Around them grow up passing customs, a mass of prescription and command. We exercise our intelligence to fit them somehow into our changing lives, or to gloze over their too insistent demands. Here is plenty of room for experiment, for criticism, for rigorous thought. Here is failure, maladaptation, impermanence. But once written into a civilization those principles remain, slowly receiving new accretions. Circumstances may cause them to be forgotten for a time, but they are rarely dislodged. They are there for new prophets to point to.

It is not likely that even the shock of science and the city can touch this core of our moral wisdom. Industrial feudalism has ignored it in practice, the

laboratory has found its truth in no equation. It is far easier to forget it, perhaps, than it was in that simpler rural world. It seems divorced from the lives we lead. And yet men have not forgot. This Hebrew-Christian-democratic ideal is even to-day marching round the world. Many have impatiently turned aside, in the name of business efficiency, realism, the scientific facing of facts. Many more have brought it into disrepute by using it as a banner to cover both their reluctant aspirations and their sordid grasping. A generation plunged without adequate preparation into the far different world that is engulfing them may well waver. The city sends men after gain and pleasure; the laboratory is no friend to any authority that cannot appeal to observation. It is only by authority that this moral standard can propagate itself: the authority of respected parents and teachers, of great prophets of old, of gallant strugglers for the right, of the immemorial past. All the forces of the day are against it; there is little doubt but that, though it may well find greater exemplification in men's lives than in the age of faith, it will not in the immediate future burn so brightly as a goal. But there will be those who will keep it alive, and, perchance give it new brilliance.

The soul of our moral tradition will endure; but the body is sick unto death. It has lived its life, and it will pass away. We do not yet know the principles by which the soul will be embodied in our new world. Men must develop new attitudes and new faiths to replace those that sufficed for the old Christian, farmer world. In our shifting moral scene the experimental temper with which men approach the older sanctities is fraught with danger as well as promise. If there is

truly something in the spirit of the Hebrew prophets, in the love of the man of Galilee, in the deepest wisdom of the Christian tradition, that men will come back to after every change, surely it can stand the test of experience once more. But that core must be supplemented by trained intelligence and adapted with painstaking care. If liberty and democracy are too precious to be lost, it is only a liberty permeated by the scientific spirit, and a democracy that has come to terms with industry, that can be preserved.

All the changing lesser moral ideals of the past are singularly unfitted to help us in our present problems. We still have a morality of submission, of acquiescence in an evil world. We have rich consolation for wounded souls, the virtues possible when life is poor and meager. We have learned how to bear misfortune nobly, and to have compassion on our fellow-sufferers. But now that we have fallen on better times we need a morality for days of prosperity. We need to learn how to use riches aright, how to reap the most from achievement. The poverty, chastity, and obedience of the monk will not serve us, for we can not flee the world, the flesh, and the devil. We must use them with intelligence. The thrift and abstinence of the Puritan will not help, for we are rich beyond the power to live. We must make wealth serve life.

Some of this essential mastery of scientific power and material riches we can learn from the Greeks. Their means were not great, but almost alone of those who have left a record, they made it their conscious task to employ what they had to create a noble life. Into it they wove wealth and beauty, art and learning and a fine sense of civic responsibility. Above all, they

realized that the good life must be ordered by intelligence. They were immune to our passing superstition that human excellence is a spontaneous, natural thing, an affair of following impulse, of unimpeded self-expression. They knew that it is a work of art and skill; they knew that it was not by just being natural that Sophocles wrote the *Antigone,* that Phidias did not carve the Parthenon frieze merely to express himself. Wisdom was their highest virtue, the wisdom that knows how to be brave and temperate and just. This insight we could well appropriate. One can be righteous on a crust of bread, and the pure of heart can see God from the gutter. But the golden flow of the machine demands the harder virtues of wisdom and self-control.

"What doth the Lord require of thee but to do justice, and to love mercy, and to walk humbly with thy God?" That counsel of Micah was perhaps enough for the simple world we have left behind. "Any man can get angry, any man can spend money, but to get angry or to spend money at the right time and in the right place and in the right manner and with the right persons,—not every man can do these things, for they require wisdom and intelligence." That counsel of Aristotle comes straight to the citizen of the industrial world.

But the Greeks were not all-wise. Their golden life was supported by slavery, and though we have revived the institution, we cannot permanently acquiesce. Written into the heart of our moral tradition are convictions the Greeks did not share. Despite all our borrowings from Greek genius, the fundamental stream of our Western ethical life finds its source rather in

the Hebrew prophets. Christianity was a democratic protest against the callous indifference of Hellenism. It dragged the good life down to a level where attainment was possible for all. Our fathers were slowly raising that level, when overnight the machine gave our whole society the means to live, if it would, with the favored few of Athens. What we are groping for is a morality that will clothe the democratic urge of the Christian tradition with the rich qualities of the best Greek life. At one time in Christian history such an attempt was made. It is no accident that men look back to-day with longing to the functional society of the Middle Ages. There, if anywhere, was the nearest approach to our problem; so, forgetful of the sordid facts, we dream of the spirit of the guilds. We need a morality to regulate the relations of groups; and the Middle Ages tried to work one out. We need a morality of social control; and the 13th century had one. We modern infidels might well find our truest inspiration in the age of faith.

But even the best aspiration of those men strikes us as woefully inadequate. Their task, after all, was child's play beside ours. Nor were they better able than any other society to make provision for inevitable change. Their solution imposed order on a static society, and it naturally crumbled when men outgrew its narrow limits. Ours is above all a fluid, developing society, a society some new invention will remake overnight. So long as science is cultivated and invention pursued, its structure cannot crystallize. It is futile for us to aim at any fixed pattern. We can learn from no static Utopia; that attempt has proved the undoing of even the best of the 19th century programs of social

reform. What is demanded is a flexible principle that will guide us as group shifts into group, as problem succeeds problem and new sources of friction arise. We need an experimental moral faith.

Is this a marriage of incompatibles? There must be something transcendent, something immune to the ordinary successes and failures of living, in that to which men give their supreme allegiance. It must possess an authority not to be upset by the shifting winds of scientific doctrine or the passing passions of men. There must be a tentativeness, an openness to revision in the light of altered conditions, in the moral code by which men meet their daily problems in a world of industrial and scientific growth. In the past, authority has been buttressed by supernatural sanctions; all the weight of social institutions has been set against change. There have been periodic cataclysms and readjustments. Is it possible to find a better way? Can we learn experimental flexibility from the spirit of science, without sacrificing our basic faith? This is the deepest moral problem that faces us; its solution may well occupy our philosophers for a century. What we are struggling toward is wholly unprecedented.

XIII

THE CONFLICT OF CIVILIZATIONS

As we of the present generation face the new civilization that is pressing in upon us, and with more or less wisdom take our stand, we need not be wholly without precedent or guidance. It is not as though the struggle had just broken out. One phase has continued now long enough for us to observe in detail how men are affected when an alien faith crowds the old loyalties into the background. For full three generations the spirit of science has been filtering into the religious idealism with which the 19th century started its career. Men have suffered, and fought, and groped, and searched, as that spirit seemed careless of what it was doing to the Christian theological tradition, for so long the intellectual world in which Europeans solved their problems. At this very day millions are just beginning to sense the conflict, as they are slowly learning a little of what science means. In their reactions they are following in the path of the great leaders of eighty years ago. But for those who have grown up in homes and schools where science is a natural atmosphere, that conflict has already lost its intensity. For them the adjustment, and especially the transfer of emotional attachment, has already been made. There are still hosts of intellectual problems in which they are keenly interested. There is still to be worked out a rational interpretation of their religious life. But for them such questions no longer

awaken the deepest passions; for they do not feel, as their grandfathers felt, and as the less educated to-day still feel, that they are torn between two faiths. They have accepted a faith in science, and for them the problem is, what can be salvaged of a moral and imaginative life that grew up around a set of beliefs they can no longer take quite seriously.

For such citizens of our contemporary world, there is no question of reconciling the truth of theology with the truth of science; they know but one truth, and that is the truth of the experimental method. For thoughtful men it might almost seem that the religious adjustment had already been made, were it not that religion is just now feeling the even more subversive influences of our industrialized society. As has been pointed out, for those who have accepted the scientific faith, what to-day keeps the religious life in ferment is not any theory of the scientist, but the largely unconscious pressure of mechanized city life. This modern conflict of religion with industry is no longer the isolated intellectual problem that faced our fathers; it has become part of the broadening struggle between all our traditions, intellectual, emotional, imaginative, and institutional, and the conditions of our contemporary life.

It is just because the last three generations confronted a comparatively isolated problem of readjustment, that in our greater perplexities we can profit by their gropings. This small bit of emotional and intellectual revolution has, for the thoughtful, been already completed; from its course we can hope to learn something of the stages through which we ourselves are destined to pass.

Broadly speaking, in this, as in most previous cases

where a strong new social force was presented for assimilation, there were four great typical attitudes widely held. There was first the large group that felt everything it cared for crumbling, and resolved, chiefly through emotional inertia, to cleave undeviatingly to the old. As the struggle issued in the breaking away of man after man from this purely conservative position, its leaders resolved on a vigorous counter-offensive. We are familiar with the firm stand and the growing power of the Catholic Church; to-day we see the fainter imitation of the American Protestant fundamentalists. Such a redoubtable effort to cling fast to the rock of ages is bound in the immediate future to grow stronger; for as the compromisers and mediators are pushed inevitably to more and more extreme positions, and the moderate groups lose adherents, men will become fearful and timid, and flock to the strongest power that promises to protect their faith.

The second group also hated and feared the new science. But they saw no way to escape it merely by clinging to tradition. For them it was the true twilight of the gods. Torn loose from the old emotional anchorage, they were unable to put forth new roots. They wandered aimlessly, bewailing, if like Tennyson or Clough or Arnold they were gifted with literary expression, the passing of the age of faith. With Omar they preached, far more than they practiced, the ancient philosophy of the disillusioned, "Eat, drink, and be merry, for to-morrow we die." With Renan or Pater they turned to the secure solace of a beauty that had been bred of stronger hopes. The more intellectual found in the philosophy of the German idealists a way to prove that God was lurking, in attenuated abstrac-

tion, behind the veil of science, and that the human spirit, though it die, could yet achieve eternal life.

The third group was impatient of this pessimism, this flight to the ivory tower, these long chains of close reasoning that led nowhere but to dialectical wastes. They prided themselves that they whole-heartedly welcomed the new science. But in flocking to its banners they brought with them the old feelings and the old cravings. What they sought in science was not the spirit of inquiry and testing, but a new religion. In the evolutionary theories of the last generation they found a satisfying theology, and in "Science" a new authority to bolster up their shaken faith. With a hectic 200% patriotism to the new scientific land of their adoption, they scorned the cravens who still clung to the Christian tradition. But in their own religious faith they carried over the same assumptions, the same emotional bias, and the same cramping finality they had learned from their fathers. Two generations ago, Herbert Spencer was their prophet; in the one just closing, Henri Bergson.

The fourth group grew up outside the orthodox fold, and drank in early the new waters of science. Hence they had no emotional attachments to keep them firm in the old faith, or to spell disaster when that faith crumbled. They had no deep craving to find in science a new religion; to them the scientific world was their natural home. Never having known another, they felt no call to reject it, or to weep over it, or to glorify it blindly. They accepted it as man's natural environment, the material with which he could build a human habitation. To them, man is a natural part of nature, his life as portrayed by science is a natural life,

and his interests and ideals are the natural flowering of the nature that produced him. These men, the first native-born citizens of the new world of science, are hence free, as none of the other groups have been, to work out their own religious destiny within the realm in which science has placed them. They can find a faith in something within the world science describes just because they accept science itself without a forced act of faith. Neither rejecting nor deifying, they can criticise and select, build and reconstruct, secure that in thus criticising and building they are at home in their world.

Which of these four attitudes any particular man took depended in part upon his temperament, and in part upon the circumstances in which he came to feel the scientific spirit. But generally speaking they have followed one another through the decades since 1860. The conservatives were at first strongest, all the more as men saw the despair induced by the initial plunge into the cold water of disillusion. The second generation, coming to maturity in the eighties and nineties, turned rather to the new evolutionary faiths. It was not till the third generation had dwelt with science that men appeared who lived quite free from the old emotional attachments.

Any thoughtful observer of the present must recognize that in our far more chilling plunge into scientific industrialism we of to-day are falling into the same four typical groups. By far the larger part of us are still bound in all our deepest ties to the old civilization. We face the new world with suspicion, distrust, and fear. This is particularly true in Europe, where the rich imaginative life of the old culture cannot fail to

awaken stronger loyalty than in the America that has but recently turned to the sources of its own being. For such, and for the cosmopolitan class of our Eastern cities that looks to Europe to escape the narrowness of a pioneering America turned industrial, the old civilization still embodies all that is familiar, and all they find really worth while. Vigorously they try to combat the new world that to them is still terrifying and alien. It is this spirit that is the emotional strength of the European conservatives: of the remnants of the English upper class; of the supporters of the old order, with all its rich intellectual and artistic life, in Germany; of the ingrained conservatism of the Paris world. They are drawing to themselves, far more than we realize, those intellectuals and artists who see clearly how all their interests are bound up with the threatened culture. It is this spirit that shrinks in fear and hatred from America. Since the days of Renan, the European has identified with American democracy and commercialism and mass-production all that is beating in upon his world. To-day, Henry Ford is the symbol that fascinates and horrifies these Germans and French and English; to-morrow it will be some new American figure. In the novels of Sinclair Lewis, in the *Americana* of H. L. Mencken, they find their worst suspicions confirmed. Yet the more thoughtful recognize that this Americanism of their nightmares is but the foretaste of what industry is steadily extending to the whole world.

There is no great institution to organize this opposition, as the opposition to the scientific spirit was organized by the Catholic Church. The political and economic conservatives, who at heart feel most keenly the

passing of the culture of which they have enjoyed the fruits, owe their very power to the industrialism that is undermining it. At most they can create oases where they can retreat into the old world. Already, as in Russia, that culture has become identified with the privileged class. This economic conflict, though of far less ultimate moment than the strife of civilizations, is thus forcing the European workers into a whole-hearted acceptance of industrialism, with its new morals and its new art. In America the second and third generation of the industrial dynasties is apt to put on European culture as a class symbol, the while it draws its living from the advance of science and technology. No figures are more typical in our cities than those cultivated souls who are pained by the American life to which they owe their existence, and vie with their European counterparts to master the intellectual and artistic wealth of the past.

As this distrust of the forces of to-day grows wider, our generation is seeing the rapid spread of a spirit of disillusionment and despair far deeper than the despair of those who in the last century felt their religious faith slipping. In the past ten years it has been heightened by the failure of the war to realize any of its high hopes; but there is in it much more than the feeling that our social problems are in our present ignorance insoluble. The deepest pessimism is naturally felt in Europe, where to the economic aftermath of the war is added the failure of the radical attempts at reconstruction and the splitting up into rival factions of all the optimistic revolutionary parties. As yet Europe has felt little of the exuberant vitality that marks our American faith in industry. The Russian Communists

seem to have such a faith—but they have very little industry. Germans once had it, but it is just pulling itself together again after the crushing German defeat. The mood in which the gloomy prophecies of Spengler were widely read still hangs over the educated German. England is reluctantly realizing that her industrial dominance of the last century is over, and is settling down to a bull-dog determination to hold her own. The English die-hards, and the sophisticated circles which enjoy Aldous Huxley and his fellows, are in no mood to welcome a new world. With their rich tradition and their inbred sense of continuity with the past, the French are peculiarly unsympathetic to a world that will make their agricultural civilization irrelevant. Hence it is little wonder that in these nations the educated classes, feeling the rising of alien tides about them, turn to their own traditional glories or to a skeptical enjoyment of the passing scene.

In America the momentum of industry is too strong for such a pessimism, unless it be among the farmers; with us there is rather a popular cynicism of protest. Like their idols Mencken and Sinclair Lewis, the emancipated thumb their noses at the old faith and the new alike. Just because they have lost the old faith in the Puritan tradition and in education and democracy, and feel no real allegiance to science or industry, they have no recourse but to acquiesce in the rule of the business man. For, in contradiction to what is usually believed, the first result of any great break-up of a moral tradition, however daring and skeptical may be the theories let loose, is in practice the following of the really approved standards of the day. When all moral ideals seem to have gone by the board, in the

age of the Sophists in Greece, in the Renaissance reaction to the Middle Ages, and now again to-day in the dissolution of the Christian tradition, there is nothing left to oppose to the sheer power of existing custom. For many a thoughtful young man to-day who feels the old ideals crumbling there is nothing left but the business success he at heart despises.

Though the post-war situation is already changing, particularly in Germany, there is every reason to look for a great increase in this pessimism and cynical disillusion. It is the invariable reaction of the man who cannot make the necessary emotional readjustment to a world that is irrelevant to his dreams. And those who are not content merely to bewail the passing of what holds their affection, are even now fleeing, as their grandfathers fled from science, to refuges from the machine. For the hundreds who take ship for Paris, there to seek in a carefree life and a dabbling at art to forget the modern world and the American scene, there are thousands whose hearts are drawn to the Europe of the past.

All the old philosophies of escape are being revived once more. Again and again, since they were first formulated for the West by the Roman citizens who found their empire too much for them, they have served as refuges for the human spirit confronted by an alien life. They fill 19th century thought and literature as strongholds against science; they will dominate our generation as it shrinks from the city and the machine. There is the skepticism and cynicism already remarked, with its wistful plunge into the gay round of pleasure. The future is dark, let us look only to the enjoyment of the present. There is the grim stoicism

that in the midst of failure struggles on for some stirring social faith. If the machine overwhelm us, at least we can perish fighting nobly. There are the growing numbers who are finding consolation in another realm. Men are immersing themselves as never before in the old culture, from the Americans who flee to it or buy it to the Germans who self-consciously cultivate the whole great German and Christian past. From the presses comes volume after volume dealing with the art and the religion that seem passing away. There is a wide interest in mysticism, the very antithesis of our contemporary science and technology. There is a yearning for the idealisms of the great traditions, in their Platonic or Post-Kantian versions. Like Dean Inge, men who hate the present find here the surest stronghold. There is the turning back to the Christian Middle Ages, which to the wistful modern eye seem to have solved so many of our problems, to have reconciled faith and knowledge, to have made commerce and industry serve the good life, and to have expressed themselves in an art that touched the whole of man. Strongest of all is the appeal of the Oriental civilizations. From foolish religious cults to philosophers like Bertrand Russell, men are looking to the East to save them. There is no question but that our century will see the full assimilation of much that China and Japan and India and Persia have really to offer us; and that cannot but be a gain. Yet it is striking that the younger Oriental students care but little for their own past, and yearn vastly for Western science and technology. Nothing is more common than for a Westerner to have to defend mysticism and spirituality and an artistic ideal of life to a thoughtful student from the East who

knows what the absence of science and technical skill and democracy has meant in the life of his own people.

Most austere of all the sources of consolation is the willingness to find in knowledge release from the pains of transition. The scientific faith is already strong enough to offer to those who really share it the salvation that in the past came from the mysteries of religion. In science, and particularly in social science, in contributing to the store of human knowledge, in seeing with unclouded mind just what is happening, there are many who to-day escape from fear and hope alike. Thoughtful men know it is good to understand the workings of imperialism, even though a fuller knowledge makes control seem well nigh impossible. It is good to have few illusions, though that often means the renunciation of the passion for change. To watch and study the storm that overwhelms us, to comprehend the forces at work, to feel deeply the utter necessity of all things, is to have what Spinoza, greatest prophet of this scientific religion, called "the intellectual love of God."

But science is too hard, and also too intimately bound up with industrialism, to prove the great highroad of escape. As in the 19th century, the more popular recourse is the flight to beauty. Our magazines and our literary circles are full of the appeal to the Golden Day or the Great Tradition. Our colleges are turning out hundreds of clever graduates who see in art the alternative to a boring and monotonous business career, or the disappointing sweat and toil of laboring at social reconstruction. But inevitably, since men come to art to escape the life about them, they find an art divorced from life and busied with technical experiments. In

spite of all that a few creative geniuses are doing, the great obstacle to artistic achievement to-day is just this flight to art as a refuge. Whatever its merits as a source of consolation, such an art can have few deep roots, little contact with vital forces. It is the art of the expatriated, devoted to æsthetic enjoyment rather than to creation, to the sense of beauty, not to the urge to achieve. Its fit symbols are those Englishmen who have fled England to live their lives on the enchanted heights of Fiesole above the tombs of Florence, or those Americans who flock to the Paris cafés and talk endlessly of what they are going to do. Yet this life of cultivated appreciation, this development of the taste of the connoisseur, is precisely that to which the majority of those who find business and industry deadening invariably turn.

We are on the whole still in the midst of this first emotional reaction to our new world. Since we cannot live in it, we seek a home elsewhere. But there is every indication that, just as the last century turned from such emotional antipathy to the most ardent faith in evolution, so we shall see an increasing faith in sheer industrialism. The strenuous acceptance of industrial society is, in fact, so much a part already of our American life that we are hardly conscious of it; it takes contact with Europeans or Asiatics to awaken us to its meaning. But when hostile criticism of the ideals of "Success" or the "American Magazine" has become a commonplace of our culture, we shall see a sophisticated and passionate defense of the faith in technology. This faith is destined to find a much more conscious expression than it has yet received. Just as the evolutionary faiths were new religions that an-

swered the old religious needs of men, we shall be told that through science and technology we can achieve all that the old world really cared for. We shall listen to praise of the way in which a rationally ordered industry will release every man to enjoy the life that in the past belonged only to the few. We shall learn that there will be a new outburst of artistic genius when the spirit is freed from long dulling toil; that there will be concerts and art galleries and noble buildings, and that mechanics will paint and sing. We shall hear from the pulpit that the old Christian ideals of brotherhood will at last be realized when the exact means of technology have been applied to the vision of Jesus. We shall hear these words on all hands; we can already hear them if we will.

Naturally industry has been forced to give a more conscious expression to its ideals in Europe. In Germany, where the conflict of civilizations has been most keenly realized, there is already a full-fledged worship of the machine. Henry Ford is the object of a cult. Poets and dramatists and painters are trying to embody the spirit of the machine age in their works. Plays are written against a background of whirring wheels and dynamos. *Industrialismus* has become a respectable philosophy. And the Russians, whom the class conflict has driven to seek a new culture for the masses, have a touching faith in the redeeming power of the machine, all the stronger as their vast industrial projects exist as yet only in their dreams. Even the Chinese nationalists talk of scrapping their immemorial past in favor of the new faith in technology and experimentalism.

Yet it is impossible that this enthusiastic acceptance

of the new society as the guarantee of the old ideals can last much longer than have the evolutionary faiths. When men arise who do not know the old world by living experience, such passionate adherence will leave them cold. They will accept the industrial, scientific age into which they are born as men have in the past accepted their environment, but they will not worship it. They will seek to use it, to understand its possibilities, to make the best of it. As the architect is ceasing to try to bend steel and concrete into the semblance of Greek temples and Renaissance palaces, and is instead exploring the forms they can appropriately assume, so coming generations will develop an art, a religion, and a moral idealism that are at one with the spirit of science and the resources of technology. As the religious conflict with science has resulted in a religious naturalism that lives its life within the realm science discloses, so the broader struggle will eventuate in what we may call an industrial naturalism. It will realize that its world is going to be very different from the world of the past. It will admit that much we cherish will be of necessity excluded from that world. But it will see also, as so few of us can see to-day, that the new life will hold possibilities men have never faced before. Just what, no one is yet wise enough to say. It will take an immense amount of thought to explore them, and to work out their problems. It will be no child's play to discover what are the permanent values of the old civilization and to incorporate them into a broadened industrial and scientific life. But just as surely as the thinkers of to-day are bringing the values of pre-scientific thought into a science that has found itself far too narrow, just so will the horizons and

vistas of the future industrial society be vastly wider than the standardized factory régime we know. Such a society, however, cannot be brought into being before we resolutely accept a faith in the instruments of technology. Just so long as we fight them, we shall have war without end.

As we attempt to plumb the future, we are confronted at the outset by an almost insuperable difficulty. Where are we to find the standards whereby to judge the new civilization? Where shall we turn for ideals we may seek to incorporate into our new life? It is all the harder to find adequate criteria of judgment because the standards, criteria, and ideals embodied in our moral tradition are just that part of the old civilization most seriously under attack. If, as we are tempted, we turn to some standard developed in the past, we shall find ourselves measuring the speed of light with a sun-dial or a sand-glass. How can we hope to judge our industrial, scientific civilization by the tests men applied to a world that could not control the forces of nature, and doomed the vast majority to unremitting toil? Purity, spirituality, indifference to the things of this world,—how could we expect to find them realized in the midst of all our means for the enjoyment and use of nature? The ideals of the East, and of long centuries of Christian resignation, will know but rare adherents in the future. The love of the gospels, the simple compassion for the sufferings of others, the sympathy bred among those enduring a common fate,—who will see the highest wisdom in these healing salves for wounded souls, when science has taught men how to avoid needless suffering and technology has abolished poverty? The great fighting

creeds of liberty and self-development, the achievement of the masterly and self-sufficient personality that need call on no other to find its goal,—how can men revere the freedom to do as one wants, when knowledge has made clearer what is good to do and industry has made every man dependent on all his fellows and responsible to them for his every act? In a world where each man is constantly wielding tremendous forces calling for the utmost of concentration, who can much longer claim the right to get drunk when he pleases? In a world dependent at every turn on exact knowledge, who can dare to educate his children in accordance with his own whims and prejudices?

Not even the Greek ideals that have so often inspired us will suffice for the coming day. The Greeks could judge states by their attainment of wisdom, of the life of "theory" or detached vision that, like their noble dramatists and philosophers, sees humantiy steadily and whole. They could cherish above all liberty, the opportunity for a chosen class to cultivate the life of reason. Our world will place practice above theory, technology above pure science; it will have no place for a leisure class.

Judged by any of these past standards, the future will lack many things that men have loved. It will not cultivate the spirit in isolation, it will not be sentimentally compassionate, it will not possess much that we should recognize to-day as liberty, it will not flower in what an Athenian would call the life of reason. So much seems clear. Yet we are equally at a loss if we are content to acquiesce in the contemporary standards of our little day. There is small reason to think business will in never-ending crescendo grow bigger

and better. There will be little room for what we covet as riches and business success. That superlative power of man over man we all secretly envy can have no place in an enduring society. The life of Park Avenue, the acknowledged or unacknowledged goal of the great majority, from aspiring labor unionist to pushing Babbitt, will fade from the picture. Men will envisage other ends than a continuous good time. It may well be that to-day we are near the peak of material production, and that a future industry will relegate the output of products to a secondary position. It may even be that in the new world there will be fewer disinterested and irresponsible scientists, fewer specialized and selfish artists.

The standards we can apply, and the ideals to which we shall aspire, will slowly emerge from the very functioning of our civilization. They will not be wholly new; we shall hardly realize what we are adding to the wisdom of old. Once the crystallized and conventionalized grip of moral tradition has been loosened, we shall not need the narrow renunciation of the rebel. We shall be free to return with open minds to the sources of our moral insight, there to find new inspiration in the human wisdom of the past. We shall escape the tyranny of emancipation; we shall no longer feel constrained to mock our parents. To-day the new world seems so strange that nothing is sure. When we have explored it and learned its geography, we shall turn to our ancestral goods to build our homes.

In the light of clearer knowledge of our problems, we can return to the fundamental values the past has served. We shall then be able to discriminate basic convictions from surface prejudices. Those ultimate

goods that make our civilization, the ingrained moral core of our lives, will stand out above the mere conventions of other ages. Respect for human personality, freedom for its development, fruitful and harmonious human intercourse, the passion for beauty and the thirst for truth,—these goods we shall still strive after, though the ways be strange. The forms they take will differ from the past. How to achieve them with our new materials and limitations will tax our ingenuity. What can be done with science, with the control of power, with the structure of living set by the machine, only time and patient experiment can tell.

We do not yet know the values immanent in our civilization. As men of imaginative insight discern them, they will be worked into the moral pattern of our life. Men will learn to cherish its possibilities. They will organize them around their basic convictions, until their minds are no longer in conflict with their hearts. They will come to value the organic unity that is possible with industrialism, the diversity of function that presupposes a unified aim. They will admire the freedom to coöperate in the unified life of humanity to which technology points. They will appreciate the skill to utilize the forces of nature wisely. They will respect, as they do not yet, the intelligence that can solve problems and make adjustments, the open-minded experimental attitude that is the very spirit of scientific inquiry. They will reverence the sensitivity to human suffering, to the needs of human personality entangled in a complicated set of relationships. They will try to combine a faith in the worth of men with the intelligence to guide and direct them.

As yet these things are largely words. When we have come really to feel them, to the core of our being, we shall discover in ourselves the sources of art and religion that will be able to flourish once more as an integral part of our social life.

That the old civilization reached heights of beauty and power we do not know to-day, is indisputable. The ideals it fought for, and was in some measure able to build into its structure, were visions of ways of life to which no sympathetic and imaginative soul can fail to respond. It is good that men lived thus, and good that they tried to live more nobly. Even as we realize that our own destiny lies elsewhere, we cannot help recognizing the achievement of the free intellectual speculation of Periclean Athens, or the imperious artistic urge of Medicean Florence. We can hardly fail to feel the sublimity of the collective faith of the 13th century that could create cathedrals and *summæ*, Divine Comedies and guild craftsmanship and the ideal of chivalric service. We may reverence the poetic life of St. Francis of Assisi even as we realize that no such imitator of Christ will arise again, and that failure would be his lot. Such imperishable moments do not recur. We may wish that it had been given us to take part in the great struggle for liberty, even though we see clearly that the heirs to those successive rebellions have never known how to value or use the freedom that was won. We cannot escape a wistful yearning for the Christian or Jewish household of our youth, that old ideal of the independent home now fading before apartments and coöperative cooking and working wives and our changing sex life. If our

feelings are too deeply entangled in these institutions of the past, we cannot escape a shudder as we contemplate a world in which they have no place.

Yet would we really give up the best that science and technology have brought us to rescue a single one of these old ways of life? The Hindu sages have a legend that in India long ago science and machine industry flourished, until men realized they were killing the life of the spirit, and turned from them in disgust. We can admire the type of spirituality that at its best India can produce, that from the height of calm wisdom can proclaim: "Do not try to do good. Be good, and cleanse with thine inward peace." In the face of the hopeless despair of Hindu life we can even understand why such a spirituality should have seemed the deepest human insight. But no Westerner who realizes what that mythical choice of spirituality has meant for India can help feeling that what she most needs to-day is just science and technology. In India more clearly even than in China one can see what it means, in terms of human suffering and sacrifice and degradation, to toil in the fields without the resources of Western technical skill. One can observe just what congested life is without Western sanitation and medical knowledge. Disillusioned though one be with the enlightenment of the average Westerner, one can realize the depths of superstition and cruel practice in which these spiritually minded seers have left the Hindu peasant, without one saving touch of our own scientific faith.

If sentimental Westerners fleeing to the Orient in cowardice before the task of facing the problems of

their own civilization will not see these things, at least the leaders of the regenerated East do. One of the outstanding minds among the Chinese Nationalists retorted to an American idealization of Chinese civilization, "There is more true spirituality in the scientific democracy of America than in all the musings of so-called Eastern wisdom." Whether he was right or not is aside from the point. What really matters is that no true citizen of our new civilization is likely to disagree with him. For all our hatred of the first effects of science and industry, we simply will not give them up. They offer too rich a promise in what we most care for, human knowledge and human well-being. Perhaps we can never learn to live with them; but having once tasted them, we cannot live without them.

Much of our attachment to the old institutions is a mere matter of familiarity of habit. They awaken childhood memories in which the past has lost its sting. The boy who lived in terror before the torments of the stern Puritan creed grows up to cherish the ingrained faith of his fathers. Show him an alien religion that in different symbols serves the same needs and springs from the same impulses, and he will recoil before its superstition. The orthodox Jew and the Catholic, though their religious life posseses so much in common, look wonderingly on each other's incomprehensible faith. How much the more do they shrink from the unaccustomed spirit of science, so alien to all religious feeling! When we have finally grown used to our new civilization, this emotional repugnance can not last. Man can apparently adapt himself to any conditions, and live his life under the utmost diversity of forms. Who can say that the

new forms will not be the richer, when they no longer press in upon us from without, but are the unconscious mould in which we function?

That in the immediate future we shall blindly try to throw overboard much of the past that need not perish, is as inevitable as that we shall later find it creeping back. In China, where the break with the old civilization is naturally a far more serious wrench than with us of the West, many of the young Nationalist leaders want to sweep the past utterly away and start with a clean slate. The wise will smile; but even such naïve folly is to be expected. Our natural scientists once imagined they had sent the whole of Greek thought to the dust-heap; just now they are reviving the scientific wisdom of Aristotle. Prophets of doom proclaim that Christianity and even religion are on the point of vanishing. New interpretations are made, names may change; but men cannot so easily escape the past that made them. Accustomed family life is certainly being transformed; but we still marry and bring up children, and so will our descendants. Could we peer into the 25th century, our chief surprise would be that so much remained familiar, not that so much had changed.

The old ways have undergone severe testing; it is certain that harder days are still to come. We know that the religion, the art, the moral ideals and social institutions of the future will differ in ways we least expect. Where we see permanence, there will be new discoveries; where we now look for alteration there will be little. Yet if much that our fathers thought the highest wisdom goes by the board, much more will be left, to share with scientific knowledge and practical

technology the task of reconstruction. Our adjustment will be more difficult than that which faced the simpler societies of the past, for the materials we must work into a new civilization are vastly richer and more incompatible. At least that very richness holds promise of new heights of achievement. We need faith,—faith in the potentialities of industry and science, faith in the vital forces of our growing civilization, faith in our ability to bring to pass a good life from out its conflicting currents. So long as we despair of the future, so long as we look back with yearning to the old world, so dear and so familiar, that is slipping away, so long as we shrink from the problems of mastering science and industrial technology, and prefer the easy refuge in some other realm, we shall remain the helpless prey of the new forces. They will toss us about unheeding and complete the destruction of the accustomed forms of our life. Many of the best of us to-day are tormented by doubts as we contemplate the sure goods of the Christian, agricultural world receding and mark the more than dubious value of much that is taking their place. It is well to be critical. Soon enough will come the stream of unthinking glorification. But those who linger with such doubt to the end will not be counted among the builders of the new world.

We need faith,—not merely uncritical asquiescence in our new surroundings, not merely the blind cleaving to the time-honored verities so loudly called for by religious leaders. We need the confidence that what is deepest and best in the long civilization that has made us, can by our earnest help clothe itself anew in richer robes. For the moment the strident cries of

the thoughtless, intoxicated by the fairy gold of pleasures and comforts, obscure the prophetic insights of the sages. But the eternal quality of genius will still be fresh when the tumult of to-day's enthusiasms has subsided. Plato and Aristotle, Hosea and Isaiah, Jesus and Paul, Spinoza and Goethe, Jefferson and Lincoln,—these men and their peers can still inspire us, though the furniture of our lives be test-tubes and dynamos. We do not find in Aristotle what seemed truth to Thomas; our Jesus is not the figure of St. Francis or Torquemada. But they still speak, and men will hearken. How can we translate their insight into a tongue that will be understood to-day?

If we have faith that the best that is old can be embodied in one life with the promise of the new, it rests with intelligence to perform the task. If men are in some degree to control the new world, and not be wholly overwhelmed, they need the hardest kind of patient, experimental thought. In any attempt to foresee the future of our society, one fact is clear: if we are not to perish on the threshold in social or international squabble, the old irresponsible, hit-or-miss, chance competition and individualism of the modern period just drawing to a close is not enough. Our industrial machine demands more careful and intelligent guidance. In the future men must try to plan its functioning, to direct it more consciously; though just how is not yet plain. But the social control the last generation has painfully and none too successfully tried to introduce, the political and union regulation of industry, the loosely unified guidance exercised by the controllers of credit, are but the first steps in the more responsible and intelligent supervision we must under-

take. Such control, to be successful, demands the development of a social intelligence the like of which we do not yet possess.

Such social intelligence is not a chimæra. During the past generation it has been slowly emerging; we are beginning to have a serious social science at last. We have gathered facts, exact knowledge. But we must know still more about the actual functioning of our social life than all our research agencies together have so far found out. We must understand human nature as our infant psychologies do not yet. We must master the resources of technology, and the means for making them known. We must strive more consciously to deepen our insight into human values. We must cultivate the kind of wisdom that can judge critically what is worth effecting of the many miracles in our power. Such a spirit will not come in a single day, or a single generation. We must not foolishly hope ever to be wholly successful, or to finish the task. It will be enough if we can keep from falling too grievously behind our needs.

Whether such social intelligence can ever operate effectively in a democratic society, is still a serious problem. It certainly cannot function through the political machinery that sufficed for the old laissez-faire world. But whether it can appear in any other is just as doubtful. So strong is the democratic urge in Western civilization that it would be rash not to look for an increasing responsibility of industry to its workers and the community.

The first and most essential task is to devise more adequate means for bringing intelligence to bear on the organization of the new civilization. We must have

faith that knowledge and skill and insight can make a difference. Such intelligence can spread more widely only as men grow aware of the conflict of civilizations, realize more clearly what is happening to their institutions, and really feel the necessity for thoughtful control and guidance. It has not been unavailing to analyze the forces at work to-day if a few come to ponder the need for a faith in intelligence and an intelligent faith in the future.

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